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COMP9900 Project Report

Project7: Accommodation Web Portal

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Background

Comparison with the market software

Today, it has become a trend for suppliers to display their products and services online for customers to choose from. Accommodation web portal is one of popular web applications in recent days. However, many accommodation websites on the market contain too much useless information, such as various types of advertisements. The unclear interface indeed affects the experience for users. Moreover, many websites, acting as middlemen, provide accommodation information to users. Users cannot get specific housing information directly from the landlord, and the price is also not very friendly.

This accommodation web portal has the clean and concise interface, and users can operate it easily. In addition, the web application can allow landlords to post accommodation information, and direct contact is so friendly. The addition of Google Map API makes the website more intelligent and convenient. Alrawadieh and Law (2019) report that the key purpose of online reviews is to understand and determine the guest satisfaction.^[1] In the website, users can express ideas about accommodation and rate them.

Benefit of your software

This accommodation web application can satisfy the requirements for both providers and users. The web portal can help users learn more about accommodation that meets their needs, so that they can choose the accommodation with the most satisfactory price and environment on the premise of meeting their own conditions. At the same time, providers can promote the product better through this platform, which can let more users know and improve the property reservation.

According to Xiaowei and Thomas (2019), web design is an important part of visualizing content strategy, and website aesthetics can affect users' intended intention for reservation to some extent.^[2] Therefore, a good accommodation web portal needs to be clear and organized well. Too much useless information on the interface can create an uncomfortable user experience, which can affect the bookings. Moreover, a clean interface does not mean a lack of functionality. When users use the searching function, the web portal will only provide the information they need, and there will be no other redundant contents. Simplicity and versatility are the characteristics of this web application.

Project Scope

Aim

The aim of this project is to design a convenient and fast accommodation rent web portal. Allowing providers to present their holiday units, and renters to review the offers and reserve or rent a property is the aim of this web.

Objective

1. Accommodation advertising module

Though photos, videos and word description are essential for providers to advertise their units, the web recommends providers to add more details to attract users, such as the number of guests accepted by providers, detailed property address, and furniture. Moreover, providers could also list nearby transportations and restaurants. After providers uploading all introductions of their units, the web will list all units depending on suburb division.

2. Accommodation search module

The filter function is necessary when there are many accommodations on the website, which is because the filter function could help users finding suitable property source quickly and accurately. Several options classified all accommodations: suburb, the number of bedrooms and bathrooms, available days, how many people are acceptable and whether support car parking. All these options will help to filter out inapposite accommodations and listing good choices for users, which decreasing the search scale. Therefore, users will have a better experience with the website. For some other similar platforms, they will record the users frequent search conditions and save them as the default search conditions when users sign up platforms next time. But this function was dropped by team considering users' different travel plans.

3. Visitors request module

The search module of the website will list accommodations closing to users' likes. Then users could click into one accommodation's page and see more details, after deciding they could book or rent the accommodation directly. The confirming of booking and rent has two processes: firstly, users input the days of staying, and the web will return the price, secondly if users satisfy the price, users will confirm and step into the

payment page.

4.Accommodation review module

In addition to providers' descriptions, evaluation and feedback from other customers is also an essential reference for users. With a review, not only does the providers' unreal descriptions of their houses be avoided, but also when there is a negative evaluation, landlords can see and improve, and users can avoid selecting unsatisfactory accommodations. Also, in order to avoid malicious evaluation, the website will restrict the permission of comments. Only the users have completed transactions on the website can comment on the properties they have lived.

System

System Architecture (data flow/system modules)

Our group decides to use the MVC (Model-Controller-View) architecture, thus there are three main modules in our website.

1.Model (Data Layer)

The model forms the data tier handling web application domain data via a business object, and the model layer is also known as the data layer, which is related to our database implementation. In this layer, SQLite is selected as our database platform. In addition, some of the data can be collected from the other sources to support our service. For example, it is complex for our team to collect the geographic information, thus, this part of the data will be collected by the third-party application interface such as google map.

2.Controller (Business Layer)

The next layer is the controller layer, which is also known as the business layer. It is the core component in the backend. The controller layer is the logical part for processing different requests from the user, such as login, sign up and booking functions. In the controller layer, it forms the application which manages the flow of the web application via servlets which is through the flask framework in our team's project and the response is displayed through the HTML pages.

3. View (Presentation Layer)

Another important layer in the website is the view model that is also known as the presentation layer of a web application seen by users' browser. The method used in this layer is trying to make the frontend looks more user-friendly, clear and beautiful, additionally, the basic technology in this layer can be achieved in HTML, CSS, and JavaScript.

System layers and logics

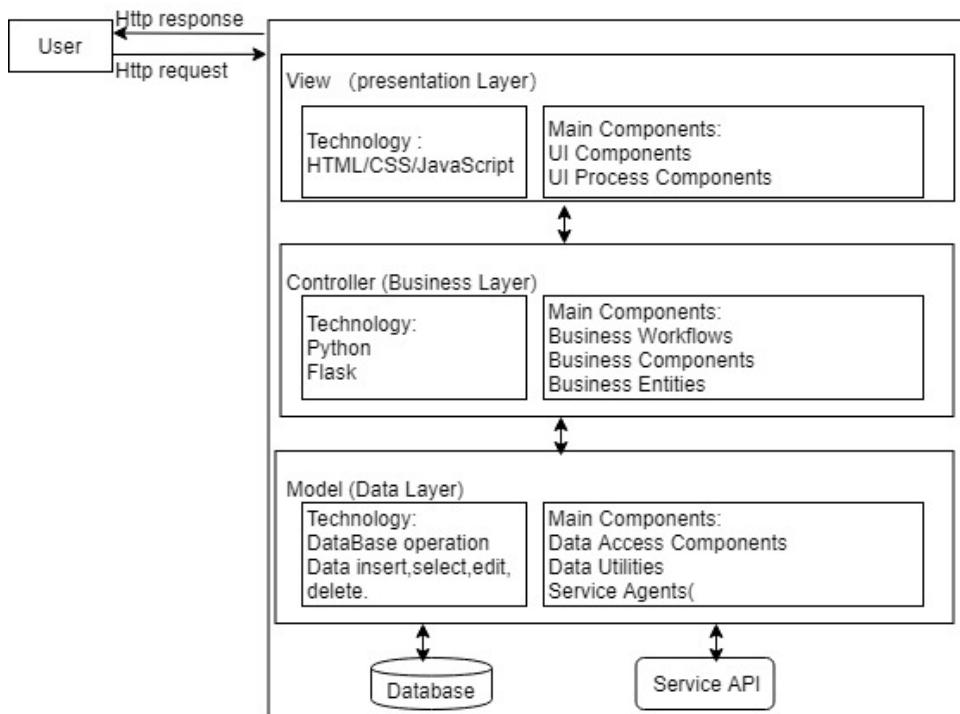


figure 1: System Architecture consisting of three layers

The figure 1 shows the data flow of the system architecture consisting of three layers. User sends the request through the HTTP protocol and the data from the presentation layer located in the browser is displayed through the HTML, CSS, and JavaScript. The response process also contains a great deal of UI components in the Frontend to make the page more user-friendly. In addition, users can select specific services on the page.

Next, the data flow will come to the Controller layer (business layer). In the business layer, the server processes different users' requests by using the logic of the business components. Specifically, the logical parts are consisting of the functions of login, sign up, searching, booking, reviewing and communicating with the host or tenant.

The functional model of the data layer will also work to support the controller when the controller layer is processing the users' requests. In the data layer, when the controller layer works, it will come with the data processing such as data selection, data insertion, data deletion with the help of the SQLite database system. In addition, not all the data

in the model layer will be stored in the database system, some services need the help of other services map function, therefore the third-party APIs is also needed in the model layer.

Technology overview

Frontend technology overview

The main technique used by the front end is HTML, CSS and JavaScript.

HTML is an identifying language, and the information written by HTML language can be expressed into HTML files according to certain rules, and, through the specific browser, these files can be “translated” into identifiable information, i.e. the visual web page. HTML is a type of language to create web page files, through the Tag instruction, to display image, text animation and other contents.

Yung Chen and Hsin Chi (2014) report more help and options are provided to help HTML files create beautiful web design.^[3] CSS, which is short for Cascading Style Sheets, is a kind of computer language used to express the Style of HTML files. CSS not only decorates web pages statically, but also formats elements of web pages dynamically in conjunction with scripting languages.

JavaScript is an interpreted scripting language for the network. Like other languages, JavaScript has its own basic data types, expressions and arithmetic operators, and the basic program framework. It has been widely used in the development of Web applications. It is often used to add various dynamic functions to Web pages to provide users with excellent browsing effects. It is often used to add interaction to HTML pages.

Backend technology overview

Our group chooses python as the backend programming language considering python can efficiently and conveniently connect the database system. Additionally, various python third-party libraries can effectively improve programmer's work efficiency.

SQLite is the database system chosen for this project basically considering the limited volume of source data. Our group manly considers cities in the range of New South Wales, which means the volume of source data is not particularly large and acceptable by the SQLite database system.

A good web application framework can make the development more efficient. Our team decides to use Flask as our web application framework. According to Patrick Vogel et al. (2017)^[4], flask written in python is an extraordinary popular framework used for the web development and can provide simplicity and flexibility via relatively low cost.

Therefore, python and flask framework are the better choice for our accommodation web portal. Flask has been widely accepted and basically achieved its portability aspects. Flask is also known as "microframework" because it uses a simple core and adds other features with extensions.

Third-Party functionalities

1.Flask

The team choose Flask as the web frameworks because flask is considered more "Pythonic" than Django is simply because Flask web application code is, in most cases, more explicit. Flask is the choice of most beginners due to the lack of roadblocks to getting a simple app up and running. [5] Especially, changes in the code file could be directly check in UI pages through the templates directory, and do not need to export every html file after every change. Moreover, the library sqlalchemy in flask help team to build and manage database using python but not professional SQL language, and avoid different operates in various database. Therefore, users' information and accommodation source are easy to insert and delete in later management.

2.API (map)

Guests or visitors are usually new to a city, that is why they need to rent a stay, and they have no idea with the address provided by landlords, therefore it is necessary inserting an intuitive map window in the accommodation page.

Developer and User documentation

1.Developer

For the developer, the flow chart can be seen in the figure 2. Data can be processed by different functions and database models. Firstly, the user can select the target function from index page (homepage) on the website, including the functions of login, sign up, searching the property, hosting a home, booking and sending messages. Different functions will process data in different database systems.

There are five different types of databases, including User, Apartment, Order, Review, and Message.

For the Signup function, data from the frontend page can be added into the user database, and for the login function, it searches the corresponding data recorded by the user model and checks whether the input is the same as the database record.

The function of hosting a home is used to add the data and pictures to the apartment database. Moreover, for searching function, it selects the data by using different features from the apartment database.

The booking function is related to the order database and review database. Created orders are added to reach the database, and reviews from different users will search the data from these databases.

The message module will record the message from the tenant to the landlord into the database system firstly, and then the landlord will receive the corresponding message when they log in their account.

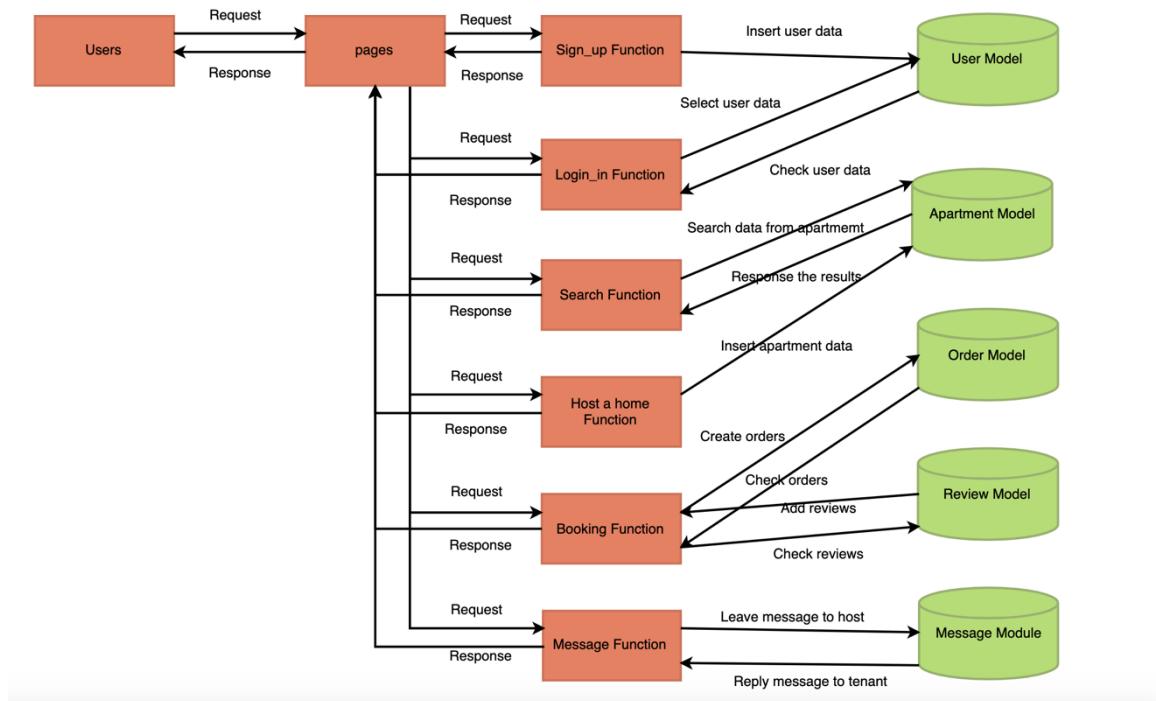


figure 2: Data Flow of Different Functions

2.User documentation

(1)Login & Signup

Every visitor can view the accommodation information in the website, including those who do not have the account. However, if visitors need to make the reservation or other operations to use the web portal, login is required. Figure 3 shows the login screenshot. The phone number is used as the login account. Each page has a link to login in the top right corner. Moreover, if visitors who would like to do some operations, such as book the accommodation or leave the message to the householder, do not login, the page will go directly to the login screen, as shown in figure 3.

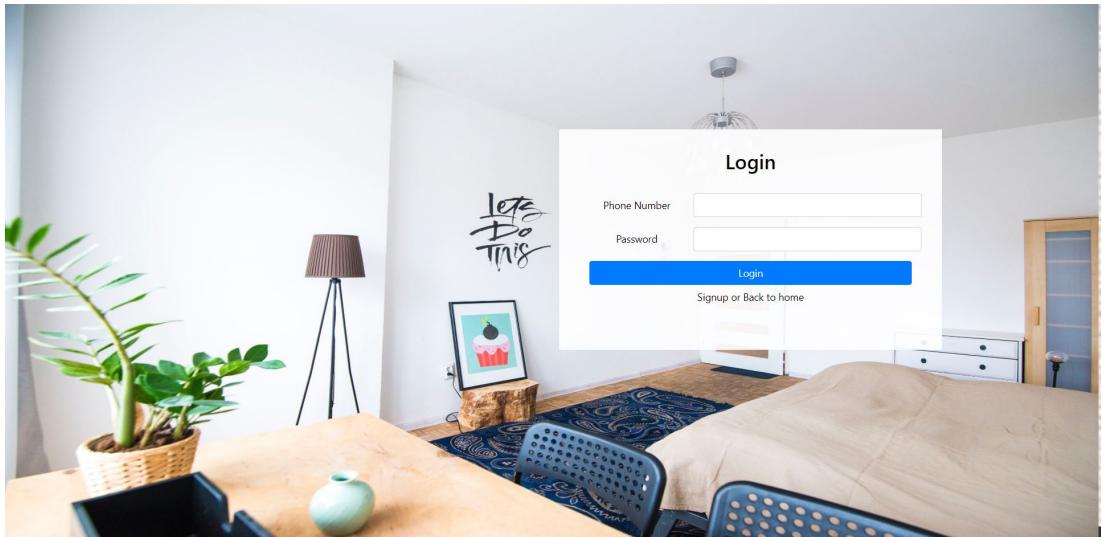


figure 3: Login Screenshot

If the visitor does not have the account, the signup link is also in the login page, and registration is simple. It just needs some necessary personal information, including username, password (The password needs to be confirmed again), birthday, email address, phone number, as shown in the figure 4. If the user does not login, each page will show the signup link in the top right.

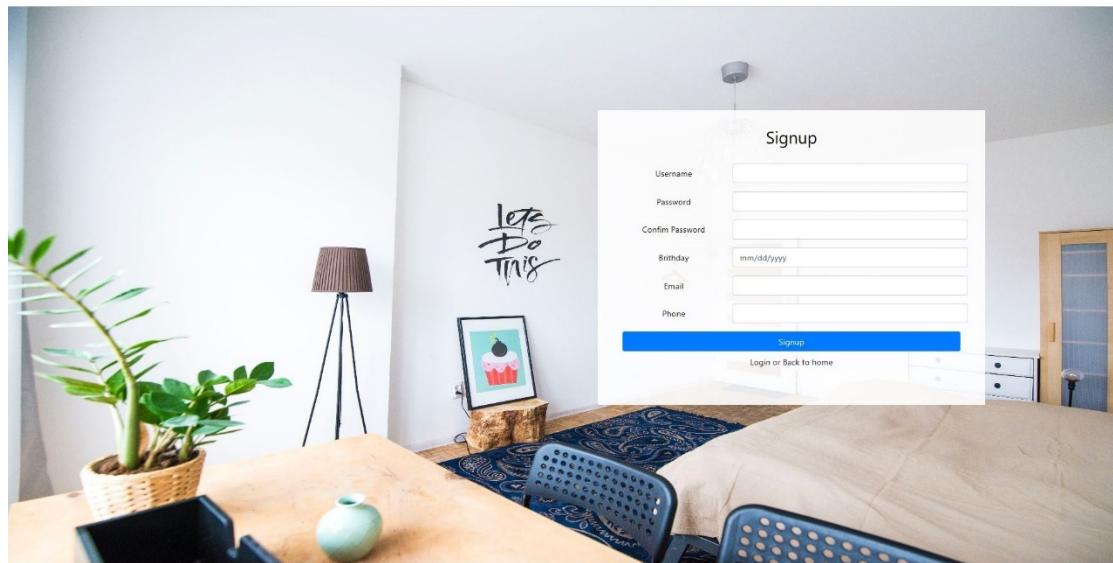


figure 4: Signup Screenshot

(2)Search

In the homepage as shown in figure 5, users can search specific accommodation which satisfies their needs. There are several conditions they can choose, such as accommodation location in the New South Wales, the number of bedrooms in the accommodation, the number of guests in the apartment, the type of accommodation (loft, apartment, house, townhouse), housing time interval. In addition, some personalized facilities are also available, including WIFI, Free parking, TV, Bathroom

and Coffee maker.

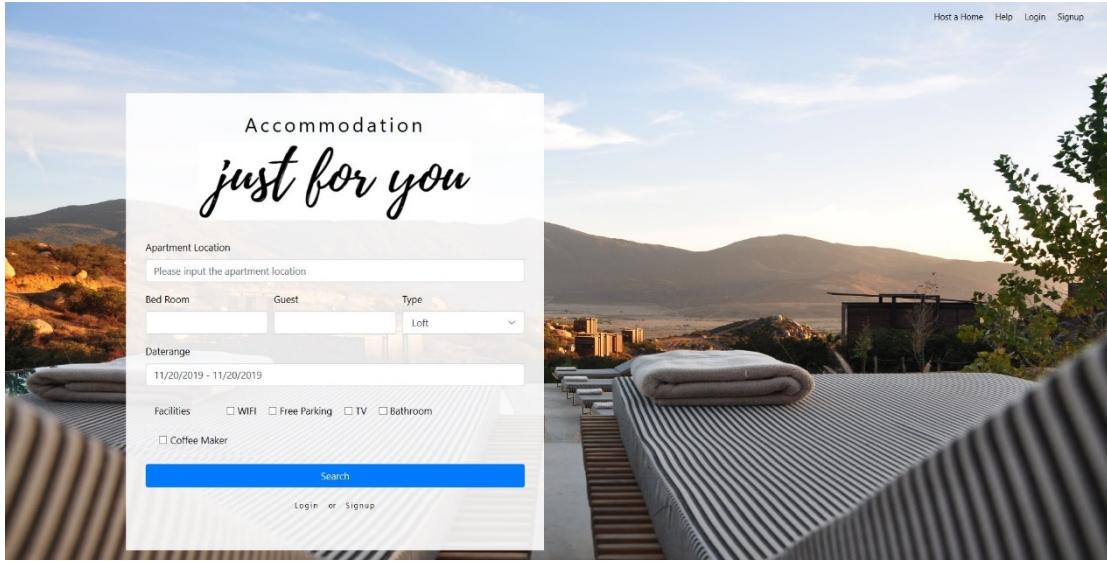


figure 5: Homepage Searching Screenshot

For example, one searching result is shown in figure 6. If the results are not satisfying, searching function area can be available at the top of web page.

A screenshot of a search result card. At the top, there's a navigation bar with 'Home', a search bar containing 'Apartment', a date range '11/20/2019 - 11/20/2019', a dropdown for 'Loft', and buttons for 'Bedroom', 'Guest', and 'Search'. Below the search bar are checkboxes for 'WIFI', 'Free Parking', 'TV', 'Bathroom', and 'Coffee Maker', all of which are unchecked. The main content area is titled 'Search Result' and shows a thumbnail image of a living room with a brown sofa, a coffee table with a vase of flowers, and a painting on the wall. Below the image is the text 'Stroll around Victoria Park from a Stylish Loft', 'Price: \$150.0', 'Type: loft', and 'Address: 348 Bulware Rd, Ultimo, New South Wales, Australia'.

figure 6: Searching result Screenshot

(3) Recommendation

Our website can recommend the similar room listings when the user click and check the specific room primarily considering the distance factor. The main considerations are the latitude and longitude that our website will recommend the surrounding rooms in the range of plus or minus latitude and longitude 0.1. The recommended rooms are approximately 10 kilometers away from the room that users are checking according to our recommendation system.

Your best holiday choice

[Booking](#) [Leave a message](#)

Price: \$90.0

Type: apartment

Bedroom: 1

Postcode: 2500

Address: 3/32-36 Keira Street

Facilities



WIFI



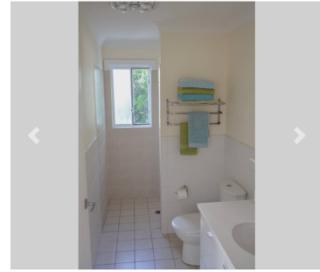
Free Parking



TV

Detail Description

Your holiday getaway occupies the entire top floor of our beachside home and ensures absolute privacy - plus it's only a 5min walk to beautiful Coledale Beach. The light-filled apartment comprises master bedroom, large kitchenette/dining/lounge, bathroom, deck and upper floor balcony, taking in the magnificent ocean views. The living area faces east, capturing the early morning sun through 2 sets of



Nearby

Stroll around Victoria Park from a Stylish Loft
Price: \$150.0

Best and luxury home for guests
Price: \$100.0

Coastline House
Price: \$110.0

figure 7: recommended rooms after searching

The figure 7 shows where users can notice the recommendation function after they check the specific room according to their preferences. Different rooms nearby the search result will be presented on the right side of the page. Users can not only search the rooms that are extremely closed to their preferences, but also can be noticed other rooms that are also in the same region.

(4)Booking

One of the most essential function of an accommodation rent website is booking. In the information page, users could click the book button showing in the figure 8 if they satisfy with the specific accommodation. Then they will step into a page confirming the check in and out date.

Stroll around Victoria Park from a Stylish Loft

[Booking](#) [Leave a message](#)

Price: \$150.0

Type: loft

Bedroom: 1

Postcode: 2007

Address: 348 Bulware Rd, Ultimo, New South Wales, Australia



figure 8: booking option

(5)Leave a message

Sometimes, the landlord's description could not tell all information to guests, that is why they need the leave a message function supporting chat online between them. On the other hand, the leave a message function protects contact information of guests and landlords. For example, if guests have more questions want to ask landlords, they could click the leave a message button as figure 9, and system will return a new page to guests. Then guests just need to input their messages and submit. Then, landlords could click message button showing in the figure 10 to check their new messages and reply. And for convenience, website users could find message button in main page, search page and accommodation page after login.

Stroll around Victoria Park from a Stylish Loft

Booking Leave a message

Price: \$150.0
Type: loft
Bedroom: 1
Postcode: 2007
Address: 348 Bulware Rd, Ultimo, New South Wales, Australia



figure 9: leave a message function

Home Apartment 11/24/2015 Loft Bedroom Guest Search Welcome back, admin! Host a Home Help Orders Reviews Message ▾ Logout

WiFi Free Parking TV Bathroom Coffee Maker

Search Result



figure 10: message button

(6)Review (Comment) Module

Review module is specifically useful for customers to choose the high-rated houses/apartments. Only customers who have already booked the specific listings can use the review (comment) module in order to guarantee that our website will not exist

malicious evaluations posted by reviewers who are hired by other housing providers.

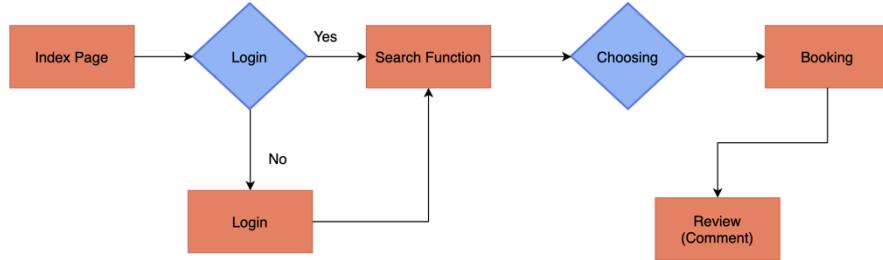


figure 11: flow chart of the review module

The flow chart shows the process of posting a review for a specific listing. Firstly, customers can visit the index page (homepage) to select the location, appropriate date, housing type, preferred facilities and number of guests. Next customers can choose the most suitable room and book it. After booking the specific room, users can have permission to comment the room that they have ordered. The review (comment) module in the website is shown in the following figure 11.

The screenshot shows a user interface for posting a review. At the top, there is a header labeled "Reviews". Below it, a message says "No Reviews". There is a text input field with the placeholder "Input your review." and a "Submit" button. To the left of the input field, there is a "Rating" section with a five-star rating scale. The stars are yellow, and the numbers 1 through 5 are placed below them. A small green circular icon is located in the bottom right corner of the main form area.

figure 11: review module after booking

Simultaneously, our website adds the rating function that allows customers to express their satisfaction in order to better facilitate customers to compare different rooms. In detail, five stars mean the best satisfaction and the only one star means the least satisfaction. Each comment will be displayed along with its rating in the review module; therefore, the potential customers can read the comments in advance and then decide which room is really suitable for them.

(7)Checking history orders

Customers can check their orders when they have booked and finished the payment. Users can click the orders button on the homepage firstly and then the website will jump to the order interface like the picture 12 and 13.

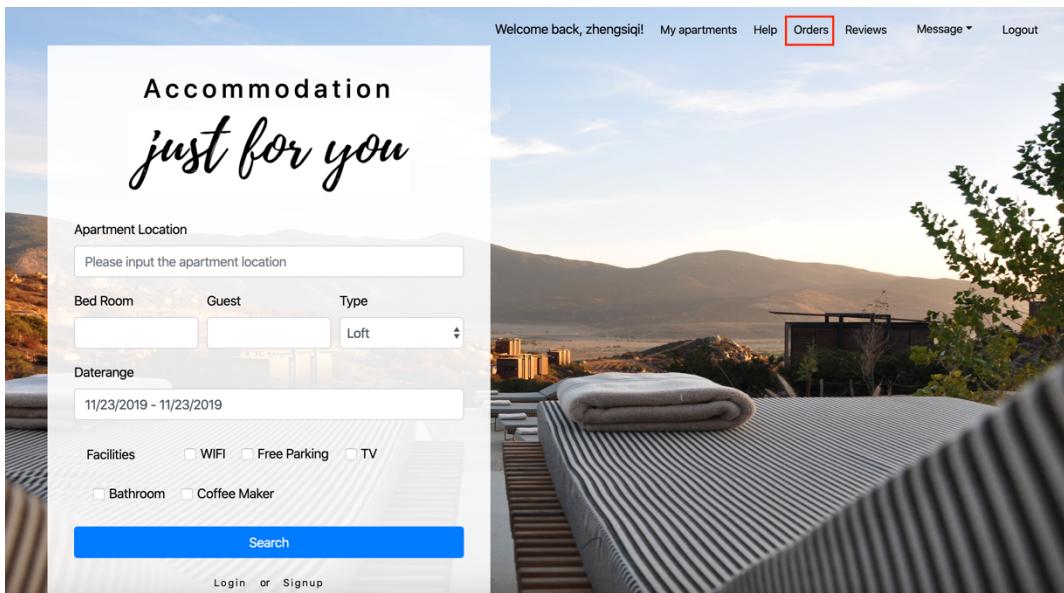


figure 12: the button of order function on the homepage

Orders

ID	Username	Apartment Name	Checkin Date	Checkout Date
3	zhengsiqi	Best and luxury home for guests	2019-11-23	2019-11-24
4	zhengsiqi	Your best holiday choice	2019-11-23	2019-11-23

figure 13: the history orders for users

As it is shown in the figure 13, all the orders made by users' account will be presented on the order interface. Users can verify their check-in and check-out date on the order page.

(8)Becoming Host

On our website, not only can you be the guest of the accommodation, but also you can host accommodation. The flow charts and the main screen shots are at following

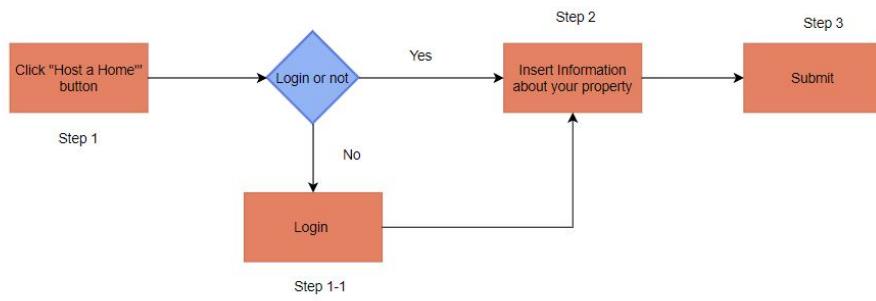


figure 14: flow chart about the becoming host

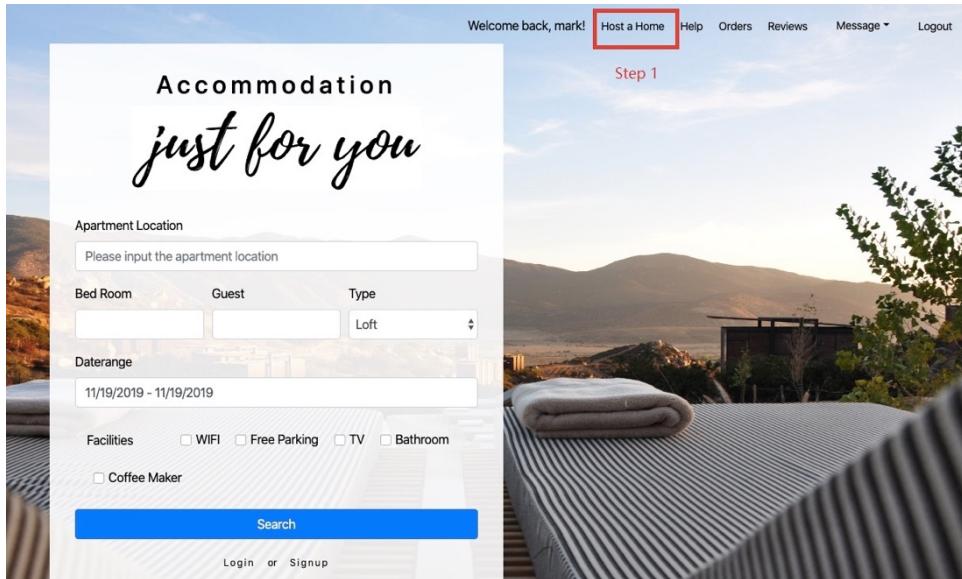


figure 15: Step 1 for Host a Home

Host a Home

Apartment Name Location

Address Postcode Longitude Latitude

Price Bedrooms Guest Type

Facilities WiFi Free Parking TV Bathroom Coffee Maker

Images No file chosen step2

Description

Submit step3

figure 16: Step 2 and 3 for Host a Home

According to the workflow, before the user can become the host of a property, they have to log in their current account. If they do not log in, the page will directly jump to the login page.

Then the page turns to figure 16, and the user needs fill in the information, including the Apartment name, type, address, postcode and location. The location is the suburb of the property that is important information used for guest searching. Another critical information for map display of the properties is the longitude and latitude; this information will be displayed on the Google map to make the location of the property easy to find. Price, the number of rooms and the number of guests are also needed. Four various types of accommodation that users can select: Loft, Apartment, House and Townhouse.

The most important parts are Description as well as the select of the facilities. The host needs to write some details and upload beautiful images about their property to attract their potential customers.

In step 2, all the information needs to be filled in order to submit successfully.

After submitting, the property can be searched and booked by other customers.

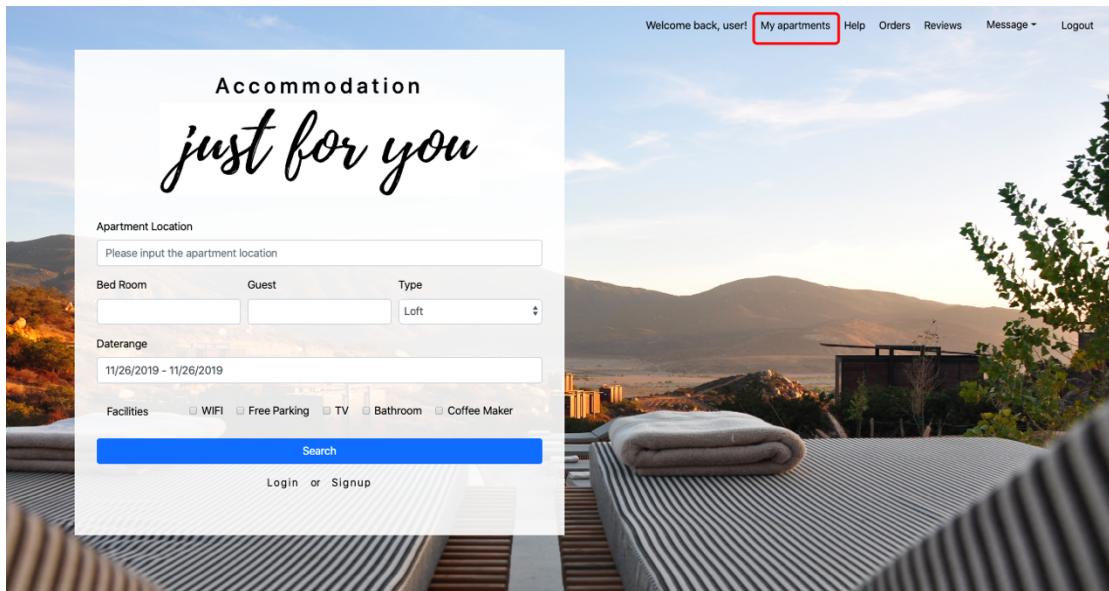


figure 17: my apartments

When the user has added the property successfully, "Host a Home" will change to "My apartments", as shows above.

My Apartments						
ID	Apartment Name	Location	Address	Price	Mean Score	Action
1	Stroll around Victoria Park from a Stylish Loft	Ultimo	348 Bulware Rd, Ultimo, New South Wales, Australia	150.0	3.5	Delete Orders Reviews

figure 18: owner actions in my apartment

After hosting home in the website, the owner also can delete the property they added, check the orders and reviews by the customers after clicking "My apartments". In this page, if the owner wants to add another property, they can also click the "Add a apartment" to add the new property like step 2.

(9)Help

For any product, it is necessary to list answers of common questions. Therefore, the team design a help page help website user get more familiar with this website, and the entrance of help page is on the right top corner with a help button.

Implementation Challenges

1. Security Module

The security of user data is extremely significant for our accommodation website, which means the passwords of each user should be encrypted in the process of storing into the database system. Therefore, our group chooses the specific encryption library called werkzeug.security that can generate hash values from the users' passwords when users sign up their accounts in the first time and then can check the correctness of their passwords according to the hash values when users log in their accounts every time. The mechanism ensures that users' passwords are not stored by the plain text in our database system and every password is encrypted via the hash function. Even if attackers illegally enter our database system, they can only acquire the hash values instead of the password in plain text. It has been proven that guessing a password through a hash value is impossible. According to Gowthaman, A. & Manickam, Sumathi. (2015), SHA256 security algorithm is appropriate for the faster data throughput and the improved security mechanism can provide greater performing frequency for web application. [6]

```
def set_password(self, password):
    # set the user's password
    self.password_hash = generate_password_hash(password)

def check_password(self, password):
    # check the user's password
    return check_password_hash(self.password_hash, password)
```

figure 19: hash functions of encryption.

The figure 19 is the screenshot of the encryption part from the project code. Encryption standard SHA-256 is the default setting for the werkzeug.security. Detailedly, SHA-256 is the encryption algorithm that converts any length of plain text to a 256-bit hash value (also known as digest) to implement encryption.

```
>>> from werkzeug.security import check_password_hash, generate_password_hash
>>> password = '123456'
>>> print(generate_password_hash(password,"sha256"))
sha256$Uv2gIR7y$ea23a74049b5c6ecb5a797c7bfd54c4187b34777d90d320c7f37f167e1e8ca8e
>>> |
```

figure 20: the screenshot from the command to show the mechanism of SHA256.

According to the figure 20, assuming the user sets up his/her password as '123456' when he/she signs up the account. However, the password will not be stored as the

plain text, on the contrary, the password will be encrypted via hash function in the process of registration and then will be stored into the database system in the form of hash values. Every time users continue to log in their accounts after registration, our website will also check the passwords via the hash values, which means the plain text of passwords will never appear in our database system, which can greatly guarantee the security of user data.

The following flow chart will clearly present the encryption mechanism and better understand the encryption process.

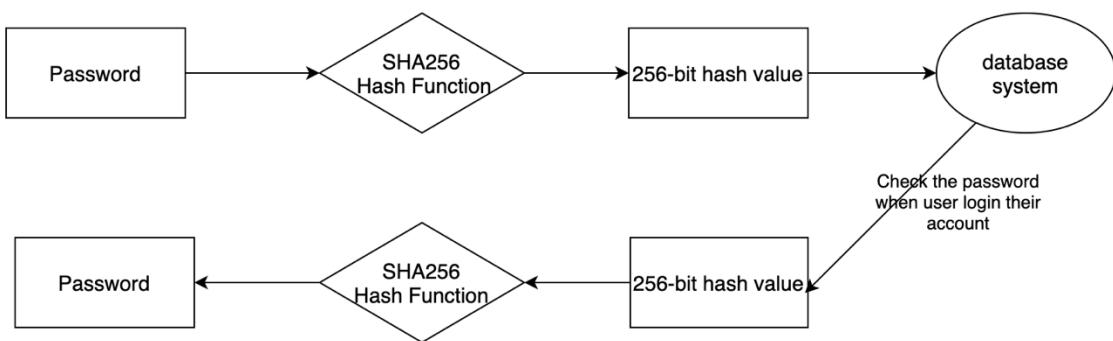


figure 21: the encryption process of SHA256.

2.Recommendation Module

Recommendation module is another implementation challenge in our website, which can recommend several rooms that are also rented to potential customers. Our recommendation algorithm basically considers the distance factors. Specifically, at the center of the search result, our website will recommend the rooms that meet the requirements of users' search preferences in the range of positive and negative 0.1 latitude and longitude. Our group considers several parameters for the latitude and longitude and ultimately decides to use positive and negative 0.1 latitude and longitude as our measure standard because our website should guarantee that the recommended rooms could be in the same suburb compared with the searching result. Therefore, considering that our website will focus on the room listings in the state of New South Wales, the plus or minus 0.1 latitude and longitude can guarantee that the recommended rooms will not exceed ten kilometers of the search results, which is the same suburb with the search result.

```

@app.route('/apartment/<int:id>', methods=['GET'])
def apartment(id):
    apartment = Apartment.query.filter_by(id=id).one_or_none()
    if apartment:
        apartment.imgs = get_imgs(apartment.id)
        apartment.nearby = Apartment.query.filter(Apartment.altitude.between(apartment.altitude-.1, apartment.altitude+.1))\
            .filter(Apartment.longitude.between(apartment.longitude-.1, apartment.longitude+.1))\
            .filter(Apartment.id != apartment.id).limit(3).all()

        return render_template('apartment.html', data= apartment)
    else:
        abort(404, 'Not Found Such Infomation.')

```

figure 22: implementation of the recommendation function

According to the figure 22, our website will recommend no more than three similar rooms to users based on their search results. And the filter function means our website will sort the surrounding rooms and the first one that shows in the recommendation module will be the nearest room compared with the searching result.

3.Google Map

The map window should not only show the street address, but also surrounding suburb by zoom in on areas of interest. You can add objects to the map to designate points, lines, areas, or collections of objects. The Maps JavaScript API calls these objects overlays. Overlays are tied to latitude/longitude coordinates, so they move when you drag or zoom the map.^[7] In this map window, the website points out where is the accommodation by an Info Window. And users could zoom the map by setting the zoom value and scan value showing in the figure 23. And guests could see the surrounding areas and specific apartment location by zoom function.

```

var coordInfoWindow = new google.maps.InfoWindow();
coordInfoWindow.setContent(createInfoWindowContent(loc, map.getZoom()));
coordInfoWindow.setPosition(loc);
coordInfoWindow.open(map);

map.addListener('zoom_changed', function() {
    coordInfoWindow.setContent(createInfoWindowContent(loc, map.getZoom()));
    coordInfoWindow.open(map);
});
var TILE_SIZE = 256;

function createInfoWindowContent(latLng, zoom) {
    var scale = 1 << zoom;
    var worldCoordinate = project(latLng);

    var pixelCoordinate = new google.maps.Point(
        Math.floor(worldCoordinate.x * scale),
        Math.floor(worldCoordinate.y * scale));

    var tileCoordinate = new google.maps.Point(
        Math.floor(worldCoordinate.x * scale / TILE_SIZE),
        Math.floor(worldCoordinate.y * scale / TILE_SIZE));

    return [

```

Figure 23: InfoWindow and zoom setting

4.Message

Leaving a message to the host and replying messages for the tenant is another implementation challenge that our group faces. After trying several different methods, our group decides to use the database as the intermediate point of this function.

(1)Database

```
class Message(db.Model):
    """
    Message Model
    """
    __tablename__ = 'message'

    id = Column(Integer, autoincrement=True, primary_key= True)
    created_at = Column(DateTime, default= func.current_timestamp())
    content = Column(Text)
    from_id = Column(Integer, ForeignKey('user.id'))
    to_id = Column(Integer, ForeignKey('user.id'))
    parent_id = Column(Integer, ForeignKey('message.id'))

    from_user = relationship('User', backref='message_sended', foreign_keys= [from_id])
    to_user = relationship('User', backref='message_received', foreign_keys= [to_id])
    parent = relationship('Message', remote_side=[id], backref='children')
```

figure 24: database implement of the message function

There will be six features in the database of the message. The id is the primary key and the foreign key ‘created_at’ stores the time when the message is stored in the database. In other words, it stores the time when the message is sent to the sender’s client. Both ‘from_id’ and the ‘to_id’ will store the information of different users who send the message and receive the message. In addition, senders and receivers are all in the user database, which means that they are all the foreign keys of the message database. Finally, the ‘parent_id’ is related to message-id which is used for the relation table of the sender and the receiver.

(2)Logic

```
@app.route('/message/<int:id>', methods=['POST', 'GET'])
@login_required
def message(id):
    message = Message.query.get(id)
    to_id = message.from_id if message.from_id != current_user.id else message.to_id
    return render_template('message.html', message=message, to_id=to_id)

@app.route('/message/add/<int:id>', methods=['POST', 'GET'])
@app.route('/message/add/', defaults={'id': -1}, methods=['GET', 'POST'])
@login_required
def add_message(id):
    if int(id) != -1:
        apartment = Apartment.query.get(id)
        if apartment:
            to_id = apartment.owner_id
        else:
            flash('Something went wrong')
            return redirect(url_for('index'))

    if request.method == 'POST':
        content = request.values.get('content')
        touser_id = request.values.get('to_id')
        parent_id = request.values.get('parent_id')

        message = Message(content=content, from_id=current_user.id, to_id=touser_id, parent_id=parent_id)
        db.session.add(message)
        db.session.commit()
        flash('Messages sented.', 'success')
        return redirect(url_for('index'))

    return render_template('message.html', message=None, to_id=id)

@app.route('/message/list', methods=[ 'GET', 'POST'])
@login_required
def list_message():
    return render_template('message.html')
```

figure 25: The message logic in backend

The logic in the backend is also related to the database and the main code can be found above.

Every step of the message at both sender and the receiver are based on the user who is current log in the website using their own account. Then our group uses a simple way to achieve the message that is sent and received by the help of the database.

Each time a user wants to send a message to the owner of the property, the backend will acquire the post method from the frontend and store all the message information including the sender id, receiver id, the content of the message and the time of the message. After that, when the receiver log in their account, if there is a message for the receiver, there will have a query process from the message database. Then the message will be listed on the browsers of the receiver. If the receiver wants to reply for the message, the same process will happen again but swapping the sender and receiver's id.

Testing (data testing system)

Testing is a critical step in software development because it determines whether the functional performance and system performance of the web application meet the design specification.

In the project, the function tests can be divided into two parts, including the unit testing and integration testing.

For the unit testing, a unit testing is needed for each function which is developed. It is implemented through the function development, which can be done well by testing the

basic functionality alone (Sandler et al., 2013) [8]. For example, after implementing the login and sign up function, the developer test including the new user can have their accounts and check whether they can log in to the account.

The integration testing tests whether the functions can work together. This test can be run when several related functions finish developing or all the basic functions finish developing. When working in the integration test, the first step is to design several test cases that test the potential mistakes in the website. The following step is to use the selenium which is a test framework to test if all the test cases can be done successfully. And the final step is to fix some problems of the website. For example, when we tested recommendation function, our group found the results could not display in the recommendation part.

After testing, all the main functions can be run correctly in the website.

Team effort

name	role	responsibility	outcomes
Siqi Zheng	Group Leader & Backend-Developer	Recommendation module, comment module, checking order function, Security part for user data	All the modules and functions can work and meet the requirements of the designed specification after testing.
Jinhang Lyu	Backend-Developer	Signup and login function, message function, review function	All the functions can work and tested meet the designed specification.
Di Bao	Frontend Developer	UI page design and data filter.	Search and accommodation page design and filter function, Google Map API.
Han Hu	Frontend Developer	UI page design and data obtain.	Home, sign up, login and listing pages design, user information obtaining, Google Map API.

Risk(management)

Number	Key risks	Risk management	Risk ranking
1	Requirement	Clearly planned in the early status	1
2	Equipment (Server)	Prepare an alternate server and ensure the capacity of the server	3
3	Organization	Organize weekly meetings and write a weekly diary	4
4	Market	Conduct adequate market researches	5
5	Operating System	Testing the website in the different systems	2

Code repositories/storage

Github is a useful code management tools, in order to keep our code clear to merge from each person, easy to manage all the edition, our group decides to use the Github as our code storage location.

In the project, all the codes are allocated at the URL below:

<https://github.com/comp3300-comp9900-term-3-2019/capstone-project-project-ar>

Sprint plan against actual milestones

number	tasks	Planned date	Actual date
1	Project selection and Scope determine	27.09.19	27.09.19
2	Website Design, Schedule, Resource Planning	4.10.19	4.10.19
3	Data collection and analysis	10.10.19	13.10.19

4	Database Design and implementation	15.10.19	16.10.19
5	Front-end implementation and Back-end implementation	11.11.19	14.11.19
6	Test and Problem Fix	13.11.19	15.11.19
7	Final presentation and Project submission	27.11.19	26.11.19

Project Management methodology

It is critical for our group to manage our project progress in order to keep every step staying on track without delay. Agile management framework is used in the project.

There are several different kinds of management methods in Agile, and Scrum is the best method to manage the software development [9]. In the Scrum team, the role can be divided into two parts, the scrum master plans and manages all the develop progress, and the all team members are the developers who develop different part of the functions in the website including the frontend which is the presentation layer in the website and the backend the business layer in the website as well as the database implementation.

To manage the team and keep the project operate running smooth, our group decides to use the stand-up meeting. Each group member reports the progress weekly and discusses some technical and design problems. The aim of meetings is to decide the goals during each develop periods including the design, developing for basic function, advanced functions and tests.

1. Stand-up meeting:

Monday (In Person) Main library

Wednesday (In Person) Main library

Friday (In Person) Main library

2.Sprite meeting:

Week 1-3 (Design)

Week 3-5 (Develop for basic function)

Week 6-8 (Development for advance functions)

Week 9-10 (Test and closure)

Conclusion

In this project, our group is aimed at creating a user-friendly website with the clear interface. The basic functions and modules such as signup, login, searching, hosting rooms, booking, checking orders, messages, recommendation, google map are all successfully realized. Our group also guarantee the efficient performance and the high stability of the website. However, our website still exists a considerable gap compared with the successful websites in the market such as Airbnb. Our group still needs to learn more new algorithm and knowledge to improve our website.

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