

Group Project Final Report

Gethub: A Ride Booking System Project

Course:

Year / Section / Group Name / Number:

CMPE 103 – Object Oriented Programming BSCPE 1-7 – Regularn't – Group 4

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I. Introduction

The idea of calling for a ride is nothing new. It dates back to the 1600s, when horse-drawn carriages served as the world's first taxi. However, as time passed, people began to create motorized taxis in the 19th century, which started to replace horse-drawn carriages. The iconic yellow taxis became popular in New York City in the early 20th century, shaping the modern taxis that we know of today.

The evolution of mobile technology led to the rise of ride-hailing apps, revolutionizing how people book transportation. In 2009, Uber was founded in San Francisco, initially offering luxury car services before expanding to standard rides. Companies like Lyft, Grab, and DiDi emerged after Uber's creation, allowing commuters to choose from various apps that provide them with the most convenience. Today, ride-hailing apps operate globally, offering ease in daily commutes and disrupting traditional taxi industries.

Soon enough, ride-hailing apps started to penetrate Philippine transportation as it was spreading globally. Grab was the first to make an entry in the country's vehicle services in 2013, and was soon followed by Uber in 2014. Both services were eventually recognized by the Philippine government, through the DOTC, and received regulations for Transport Network Vehicle Service (TNVS) in the year 2015. Currently, there have been several vehicle services that were created locally to provide convenience to the masses.

The sole purpose of ride-hailing apps is to provide convenient and on-demand transportation by connecting users and drivers through an app. In today's fast-paced world, getting from one place to another safely and hassle-free is a top priority. That is why we developed **Gethub** — a ride-hailing app designed to provide faster, safer, and more accessible transportation for everyone. This project aims not only to address everyday commuting needs but also to serve as a practical application of all the concepts of Object Oriented Programming. Through **Gethub**, we intend to demonstrate how OOP concepts can be effectively used to build a simple yet functional ride-booking app.

II. Objectives

The general objective of this project is to demonstrate the application of object-oriented programming by developing a functional and straightforward ride-booking system app.

Specifically, the goal of the project is:

1. To apply object-oriented programming concepts, including classes, inheritance, and polymorphism.
2. To learn and implement file handling in Python for saving and retrieving application data.
3. To design and develop a graphical user interface using Tkinter.
4. To understand and apply fundamental software engineering principles, such as modularity and encapsulation, in a practical application.

III. Scope and Limitations

The Gethub Team focuses on the core functionalities of a ride-booking application, though it operates with several notable constraints that define its current operational boundaries.

Scope:

1. Booking a ride:

- Routing calculation from a pickup to a dropoff point that can be manually placed and removed by the user on the map
- Location name entry option with basic auto-suggest feature as an alternative for manual marker placement
- Vehicle selection options such as a car, a van, and a motorcycle
- Importing booking information from a saved booking file

- Clearing booking information
- Distance, estimated time of arrival, and cost calculation based on the generated route and the selected vehicle
- Confirming and cancelling a booking

2. Saving a ride:

- Database of confirmed and cancelled rides with booking information details displayed.
- Saving (downloading) the selected ride as a file that can be used on the next booking for a much easier booking.

3. User experience:

- Account creation, log in, and log out
- Account customization
- Account-specific ride database
- App configuration
- About us and contact us page for developer-user interaction

Limitations:

1. Limited Error Handling for External APIs:

- Limited auto-suggest search results
- Inefficient routing path calculation
- Slow calculations and importation of location information and paths

2. Real-time Driver Tracking: The system does not include real-time GPS tracking of drivers or vehicles.

3. Payment Integration: No actual payment gateway integration is implemented; fare calculation is for estimation purposes only.

4. Driver-Side Application: No interaction between rider and user. The system is purely user-facing; there is no separate application or interface for drivers to accept or manage rides.

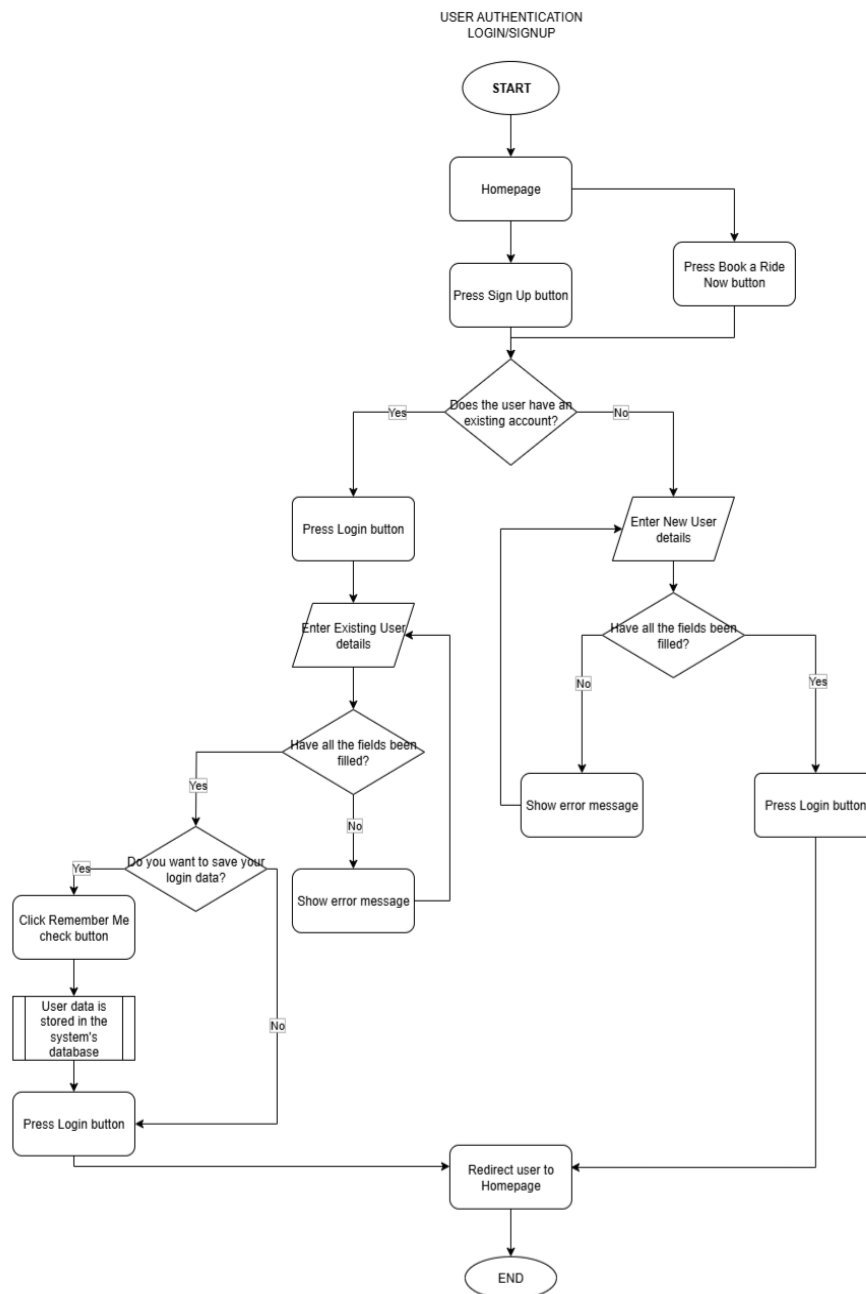
IV. Methodology

To maintain a smooth process in project creation, this project followed the **Software Development Life Cycle (SDLC)** using the **Agile** methodology as the development approach. The Agile framework is an iterative methodology — a flexible, trial-and-error approach to building better products and projects (Martins, 2025). This framework allowed the team to easily identify which features needed changes and improvements, and effectively prioritize tasks based on the most critical requirements and user needs. In addition, the project utilized a Component-Based Architecture, which breaks down the system into smaller, reusable, independent, and manageable components. With the use of this approach, the team was able to focus on coding, testing, and improving their respective parts individually and efficiently while maintaining the overall stability of the system.

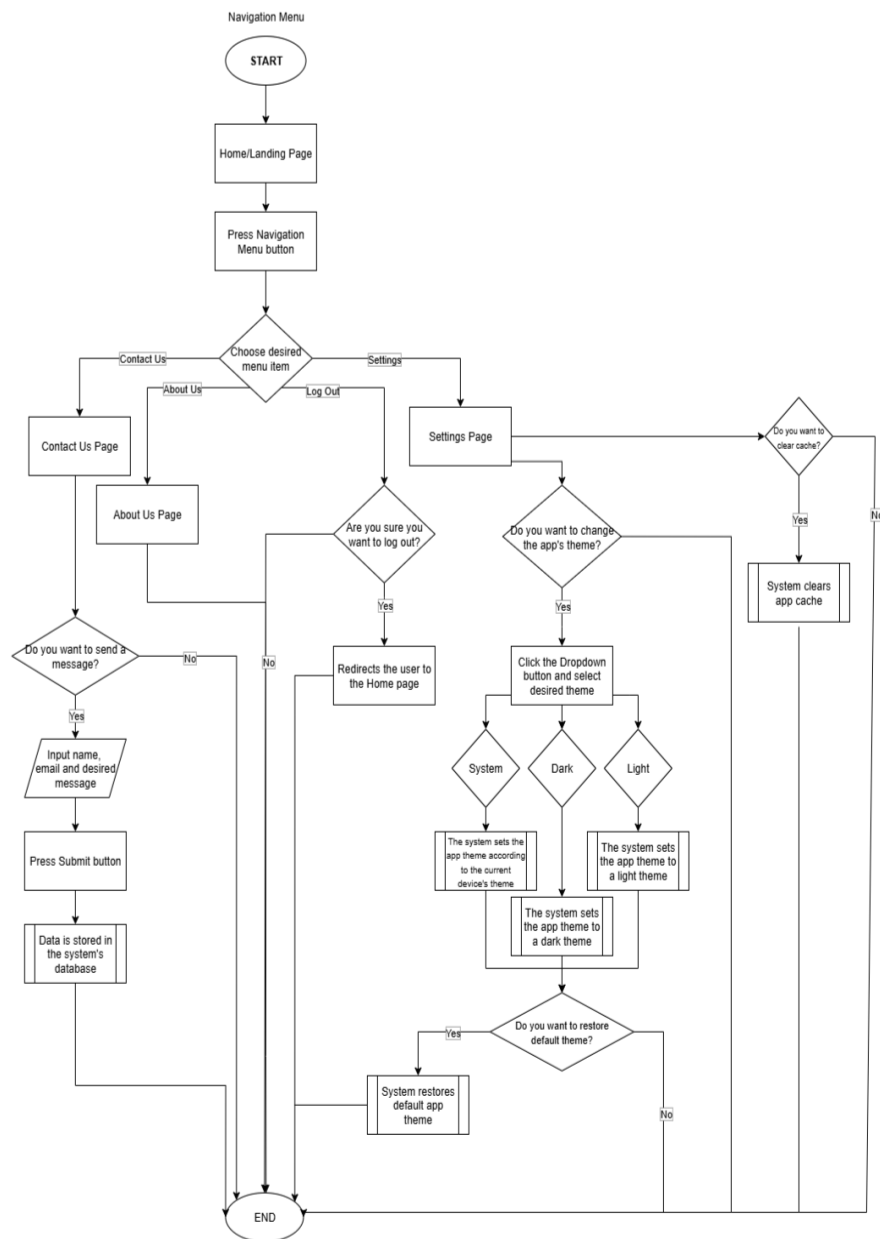
V. System Design

USER EXPERIENCE FLOWCHARTS

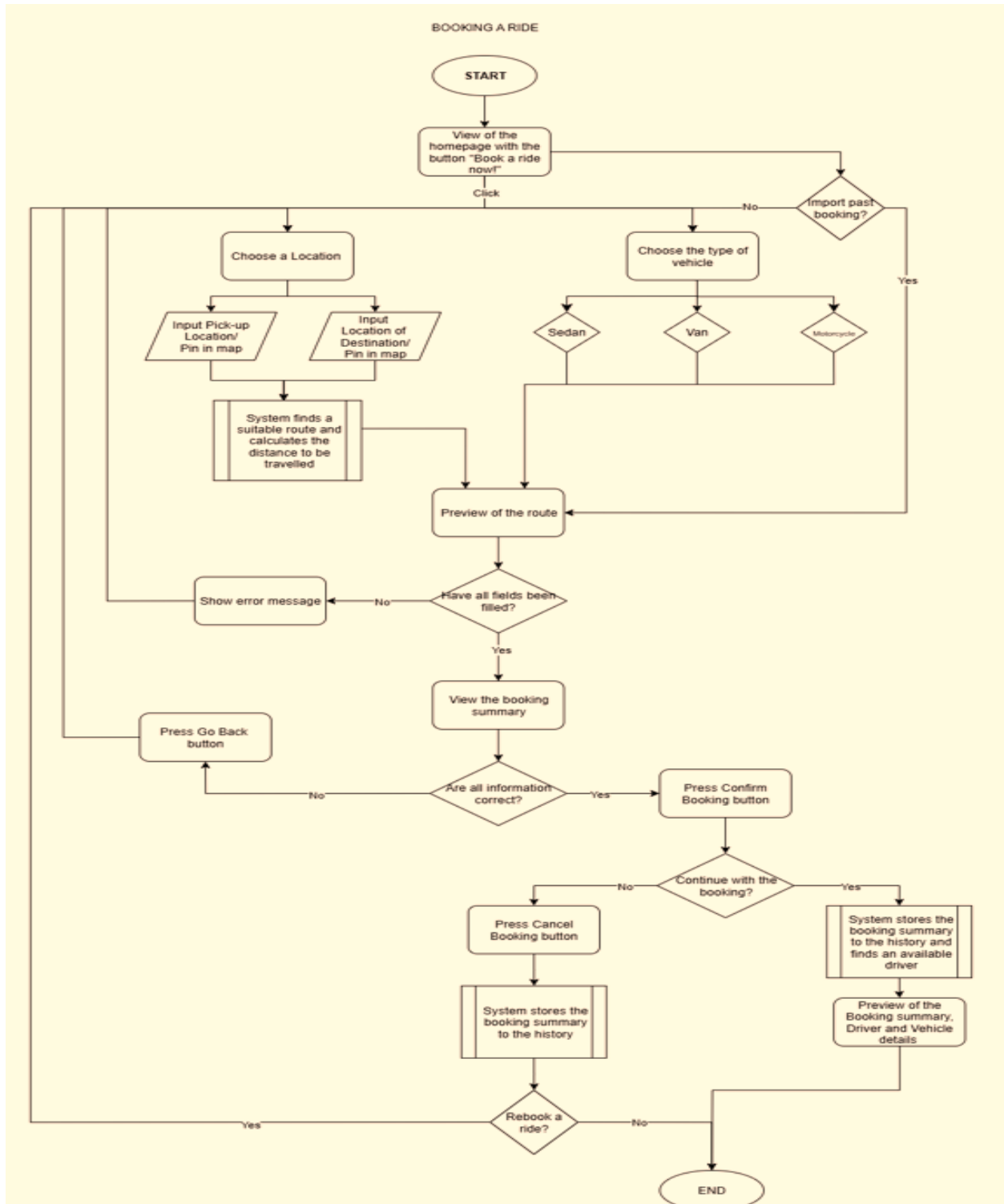
1. User Authentication: Log in/Sign up



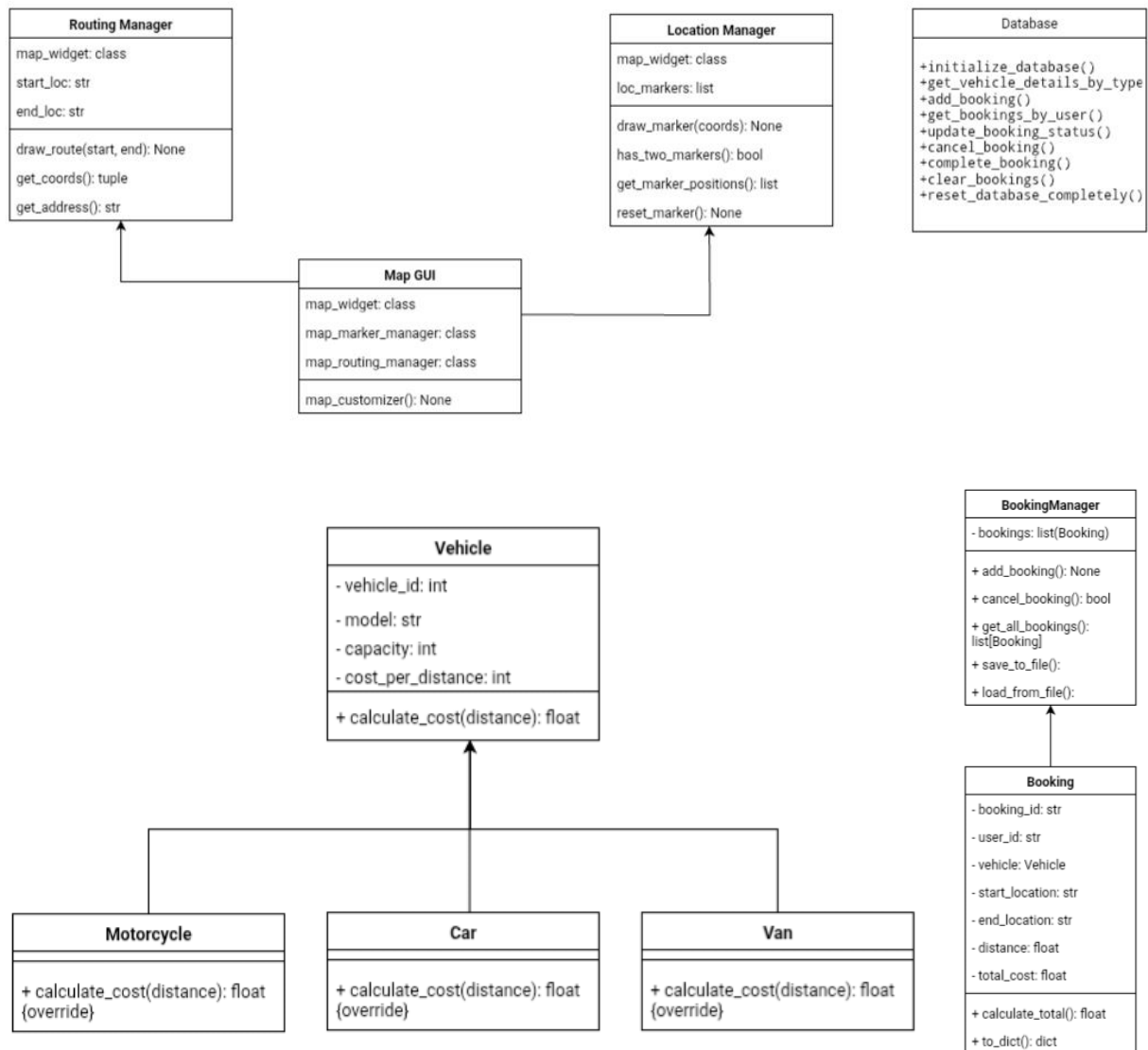
2. Menus Navigation



3. Ride Booking



UNIFIED MODELLING LANGUAGE (UML) DIAGRAMS



VI. Technologies Used

The programming languages, frameworks, libraries, tools, and platforms used in the project are the following:

Programming Language: Python 3.X

Libraries/APIs:

CustomTkinter – GUI

Pillow - Images

Visual Studio Code - IDE

TkinterMapView – Map GUI

Google Docs – Documentation

OpenStreetMap – Map Information

Figma – Wireframes and Logos

Open-Source Routing Machine – Route Calculation

Draw.io – Flowcharts

Geopy – Geocoding

Git/Github – Version Control and Collaboration

Geoapify – Location Addresses

Discord – Communication

SQLite – Database

Platforms:

VII. Implementation

Features Developed

- 1. Interactive Map Interface** - Using TkinterMapView integrated into a CustomTkinter GUI, users can select pick-up and drop-off locations by clicking directly on the map. This enhances usability by visual location selection rather than manual address entry.
- 2. Route Display with OSRM** - Once locations are selected, the system queries the OSRM API (using a Python wrapper around OSRM) to calculate and display the fastest route on the map. The route geometry is drawn interactively, showing the path between the two points.
- 3. Distance, Time, and Fare Calculation** - Using OSRM's routing data, the system calculates the distance (in kilometers) and estimated travel time (in minutes). Based on these and the selected vehicle type, the system computes the fare in local currency (P) using predefined rate schemes.

4. Multiple Vehicle Types Selection - Users can choose from various vehicle categories (e.g., sedan, SUV, van), each with different fare rates per kilometer. This selection dynamically influences the fare calculation.

5. Ride Booking Management - Users can book a ride, which is then stored in the SQLite database. The system enables users to view existing bookings and cancel rides as needed, providing a straightforward booking management interface.

Implementation Details

1. Map Interaction: Tkintermapview handles map rendering and mouse click events to capture coordinates for pick-up and drop-off. These coordinates are passed to OSRM for routing.

2. Routing with OSRM: The Python OSRM wrapper sends requests to the OSRM server (local or public). It fetches route details including distance, duration, and step-by-step geometry. The route is decoded and drawn on the map widget.

3. Distance & Time Extraction: The OSRM response includes distance (in meters) and duration (in seconds). These are converted to kilometers and minutes, respectively, for display and fare calculation.

4. Fare Calculation Logic: $\text{Fare} = \text{Base fare} + (\text{Distance in km} \times \text{Rate per km})$ based on vehicle type). Rates are configurable and stored in the database or in code.

5. Database Management with SQLite: SQLite stores user bookings with fields such as booking ID, pick-up/drop-off coordinates, vehicle type, fare, and booking status. CRUD operations allow for managing bookings.

6. GUI Components: CustomTkinter forms and buttons facilitate vehicle selection, booking confirmation, viewing bookings, and cancellation. The interface updates dynamically with map and fare info.

VIII. Testing and Evaluation

Our app development process incorporates manual testing to ensure functionality, reliability, and a positive user experience.

Test Case Summary

Module	Test Case	Input/Scenario	Expected Result	Actual Result	Status
Authentication	Invalid password submission	User enters wrong password	Error message displayed	"Invalid credentials" shown	Pass
	Admin login verification	Admin username + correct password	Redirect to admin dashboard	Successful redirect	Pass
Booking	Vehicle selection → Fare calculation	Van selected for 10km distance	Calculated fare: ₱245.00	₱245.00 shown	Pass
	Empty location fields validation	No pickup/dropoff entered	Booking disabled	Button remains inactive	Pass
History	JSON export functionality	Click "Save" on completed booking	JSON file with booking data	File downloaded successfully	Pass
	Pagination (20+ bookings)	Scroll through history page	Smooth loading, no crashes	No rendering issues	Pass

IX. Results and Discussion

The final product, the Gethub Ride Booking System, successfully met its primary objectives, delivering a functional and user-friendly application for ride booking.

1. Interactive Map and Route Display: The integration of OpenStreetMap and OSRM allowed for seamless selection of pickup and drop-off locations, dynamic route display, and accurate calculation of distance and estimated time. This core functionality was a key objective and was fully realized.

2. Fare Calculation and Vehicle Selection: The system accurately calculates fares based on distance and selected vehicle type (Car, Van, Motorcycle), demonstrating the successful implementation of the pricing model and vehicle management.

3. Booking Management: Users can successfully book rides, view their booking history, and cancel active bookings, fulfilling the objective of comprehensive booking management.

4. User Authentication and Profile Management: The robust authentication system (signup/login) and profile management features (updating personal details, changing password, managing profile picture) were implemented as intended, providing a secure and personalized user experience.

5. User Interface and Experience: The CustomTkinter framework enabled the creation of a modern and intuitive graphical user interface, enhancing the overall user experience. Features like autosuggest for addresses and clear visual feedback on the map contributed significantly to usability.

Challenges Faced During Development

The development process, while successful for us, faced several challenges for the team.

1. API Integration Complexity: Integrating external APIs like Geoapify for autosuggest and OSRM for routing required careful handling of asynchronous requests, error management (e.g., connection timeouts), and parsing of complex JSON responses.

Ensuring smooth and reliable data flow between the application and these services was a significant hurdle.

2. Database Management and Schema Design: Designing an efficient and scalable SQLite database schema for users, vehicles, and bookings, along with implementing robust CRUD operations, demanded meticulous planning and execution. Ensuring data integrity and handling relationships between tables (e.g., `user_id` and `vehicle_id` in bookings) was crucial.

3. Real-time Updates and State Management: Managing the application's state across different components, especially concerning map markers, route lines, and booking information, proved challenging. The `BookingInformationManager` was developed to centralize this, but ensuring all UI elements reflected the correct state in real-time required careful synchronization.

4. User Experience Refinements: Iteratively refining the user interface and experience, particularly for features like password visibility toggling, error highlighting in forms, and the profile picture cropping functionality, required continuous testing and adjustments to achieve a polished feel.

5. Team Collaboration and Version Control: Coordinating development efforts among multiple team members using Git required consistent communication, adherence to branching strategies, and effective conflict resolution to maintain a stable codebase.

X. Conclusion

Throughout this whole project creation, we gained many valuable insights not only in applying the technical concepts of OOP but also in understanding the importance of effective teamwork and careful planning. Before the project creation, we were able to study the Python language, basic concepts of OOP, and the basics of using Tkinter in creating GUIs. Throughout the project creation, we gradually learned how to apply the knowledge we gained from our lectures on Object Oriented Programming (OOP) and Tkinter. Moreover, this project allowed us to fully grasp the concepts of OOP, different

functions of GitHub, how to fix and handle conflicts, database handling, advanced coding, file organization, and the importance of understanding the documentation of the modules that are being imported in our program.

The entire process and outcome of the project creation left a significant impact on our experience as Computer Engineering students. It allowed us to experiment on our newly obtained skills, explore how we can implement the ideas that we have, and assess whether our current plans are doable or not. Additionally, it expanded our experience in coding and programming, designing, and software engineering principles.

Thanks to the continuous communication and teamwork of our team, we were able to successfully develop a simple yet functional ride-booking system app. The regular meetings and constant updates of changes made it easier for us to quickly address the challenges and make necessary adjustments along the way. This project allowed us to not only enhance our skills but also strengthen our ability to work collaboratively, manage time effectively, and solve problems as a team. Without the collaboration and proper planning, completing this project on time would not have been possible.

XI. Future Work

The Gethub team plans to implement additional features and improvements for future versions such as:


1. Add payment gateway (PayMaya API).
2. Multi-language support.
3. Vehicle and User Connection and Interactions
4. Implementation of AI on Gethub application


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- Welcome to GeoPy's documentation! — GeoPy 2.4.1 documentation. (n.d.). <https://geopy.readthedocs.io/en/stable/>
- TkDocs Home. (n.d.). <https://tkdocs.com/>
- Pillow. (n.d.). Pillow (PIL Fork). <https://pillow.readthedocs.io/en/stable/>

Appendices

Repository installation and setup

 **Setup Instructions**

 **1. ✓ Check if Python is installed and on the required version**

Open Command Prompt/Terminal and run:

```
py --version
```


or

```
python --version
```


or

```
python3 --version
```

If python is **not** installed, download it from:
<https://www.python.org/downloads/>
Make sure to check "Add Python to PATH" during installation.

 **2. 📄 Clone the GitHub repository**

```
git clone https://github.com/nug3tss/ride-booking-system  
cd ride-booking-system
```

 **3. 🐍 Create a Virtual Environment**

```
py -m venv .venv
```

or


```
python -m venv .venv
```

or


```
python3 -m venv .venv
```

Activate it:


```
.venv\Scripts\activate
```

 **4. 📦 Install the Required Libraries**

```
pip install -r requirements.txt
```

 **5. 🚀 Run the Application**

```
python main.py
```

 **! IF THE TERMINAL COMMANDS DON'T WORK**

Add the possible prefix/es:

```
py -m
```

or

```
python -m
```

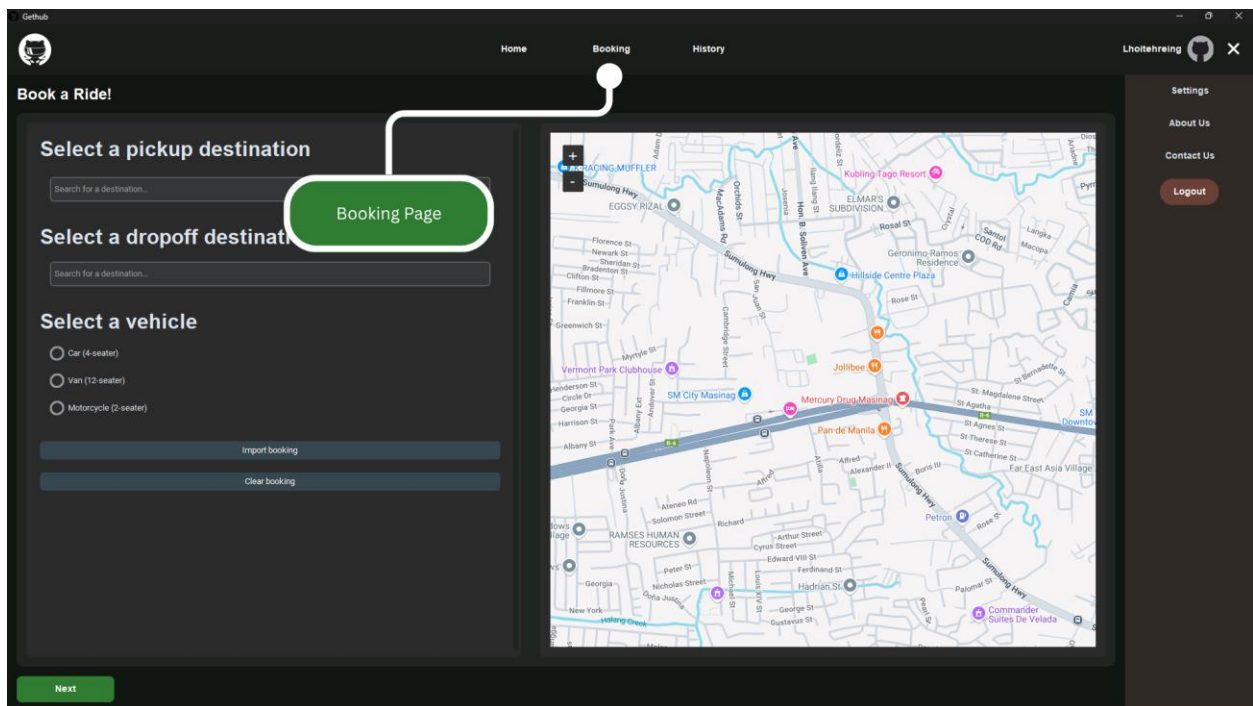
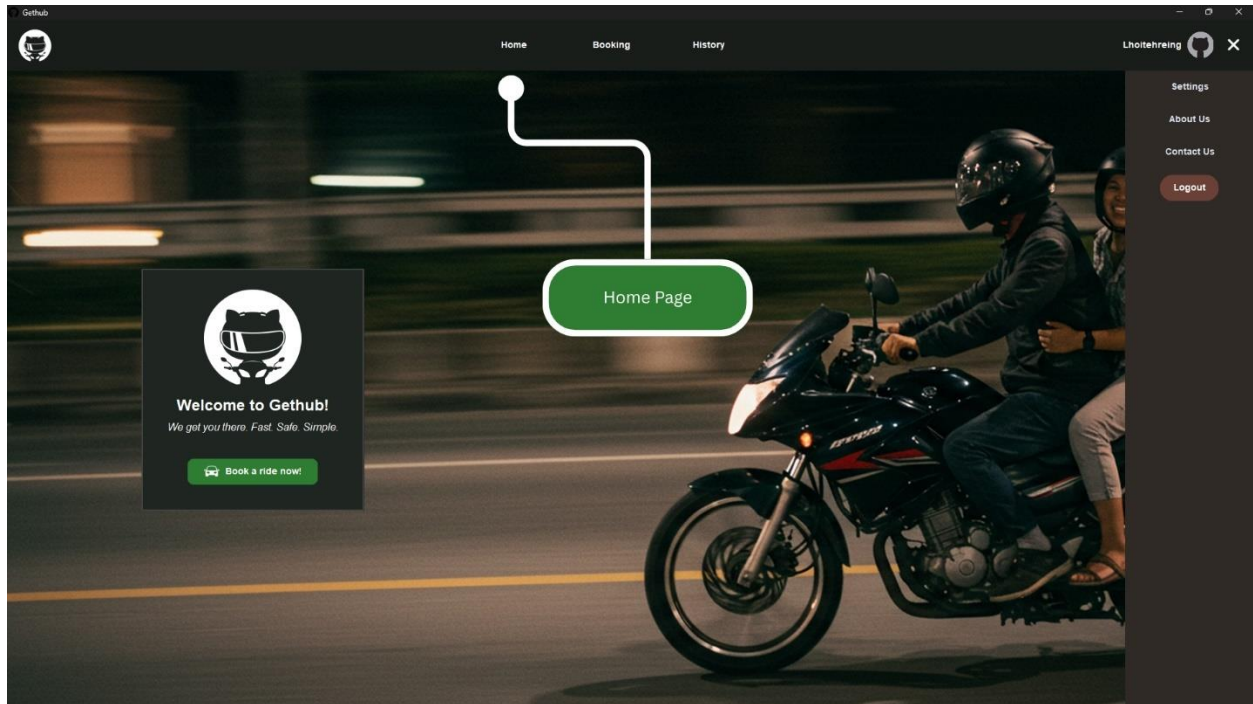
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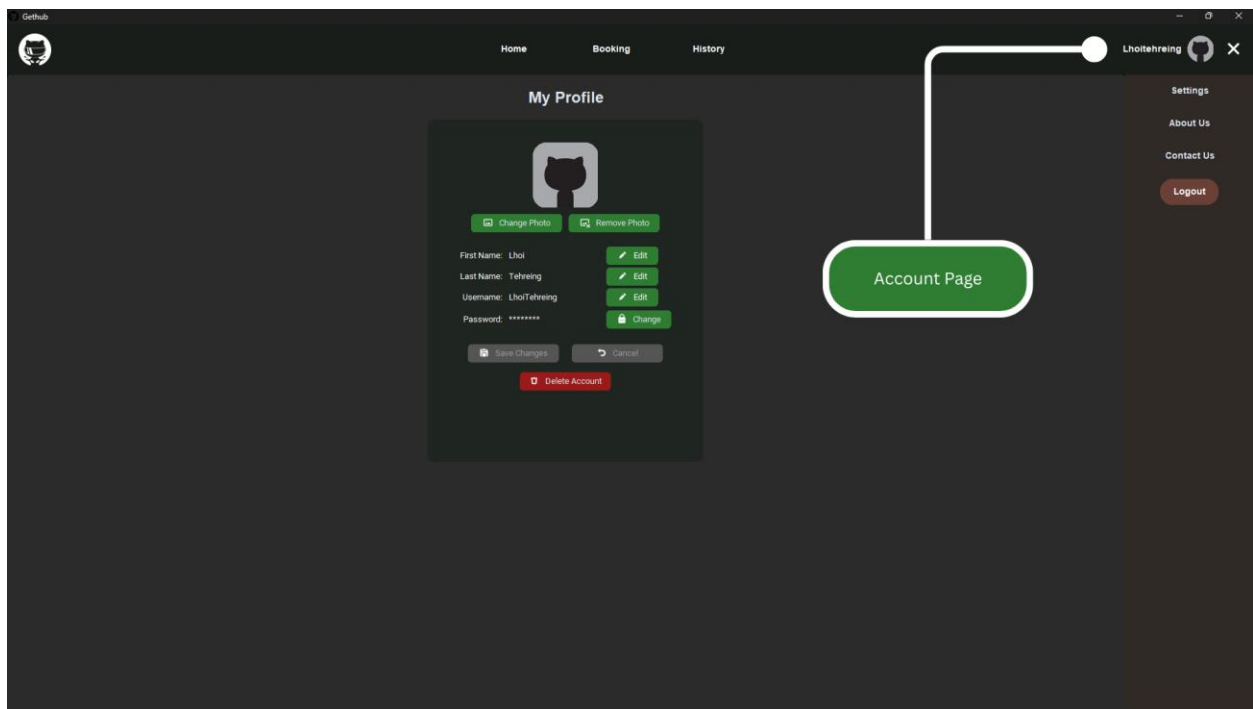
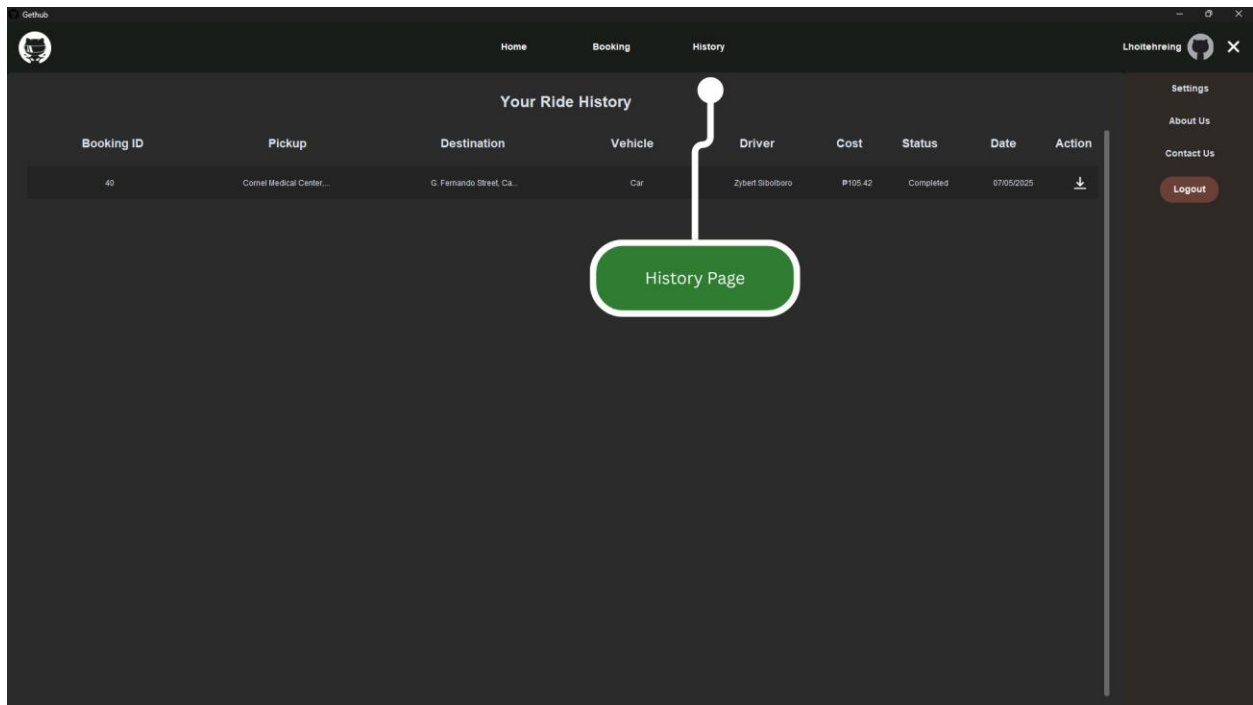
```
python3 -m
```

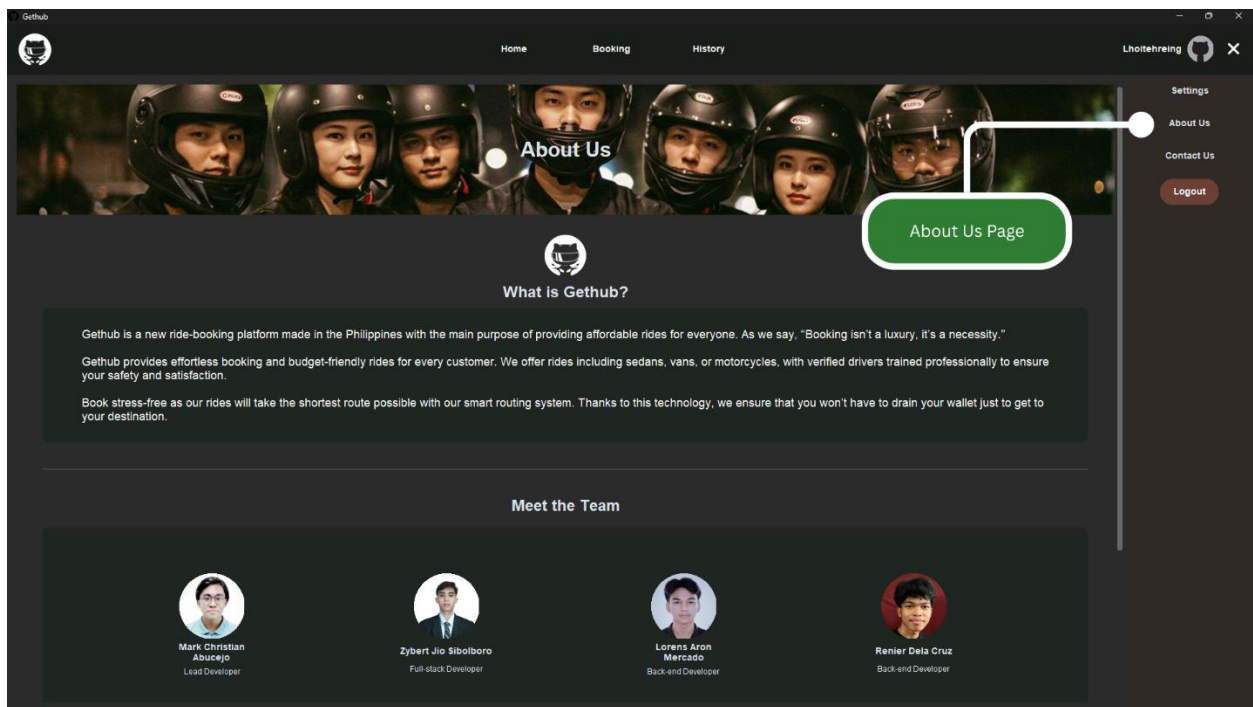
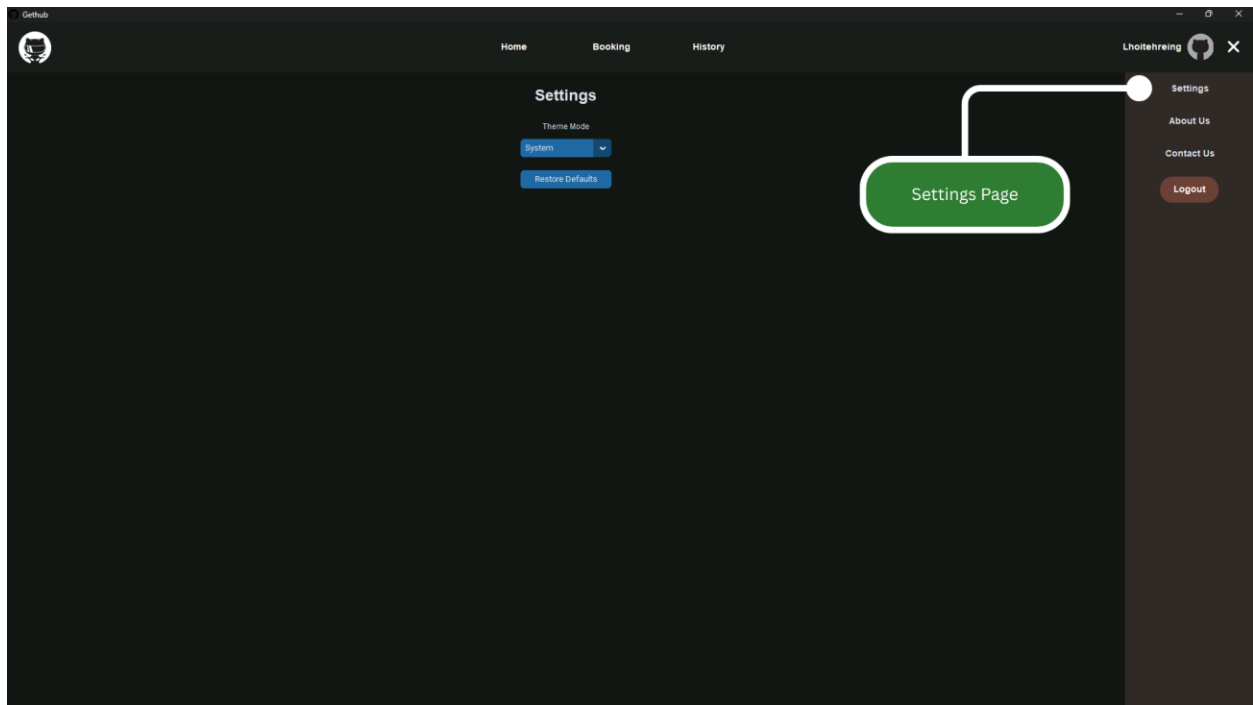
then type the terminal command.
For example:

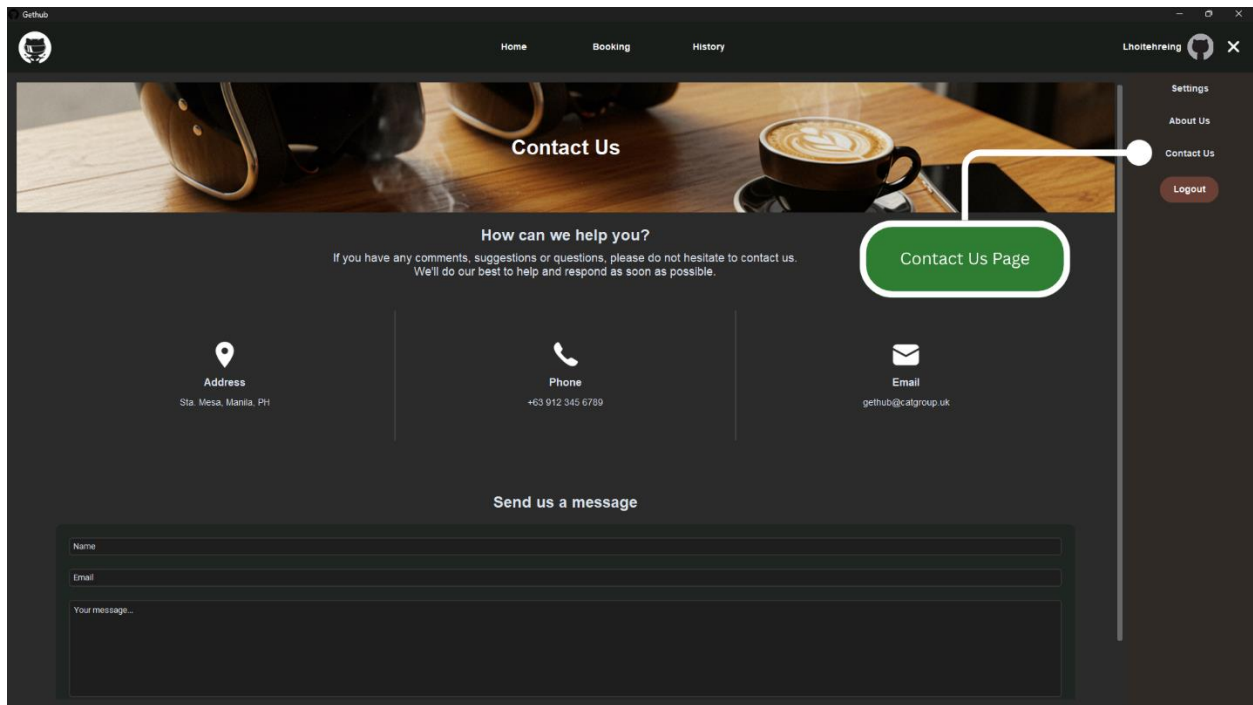
```
py -m pip install -r requirements.txt
```

App menus guide

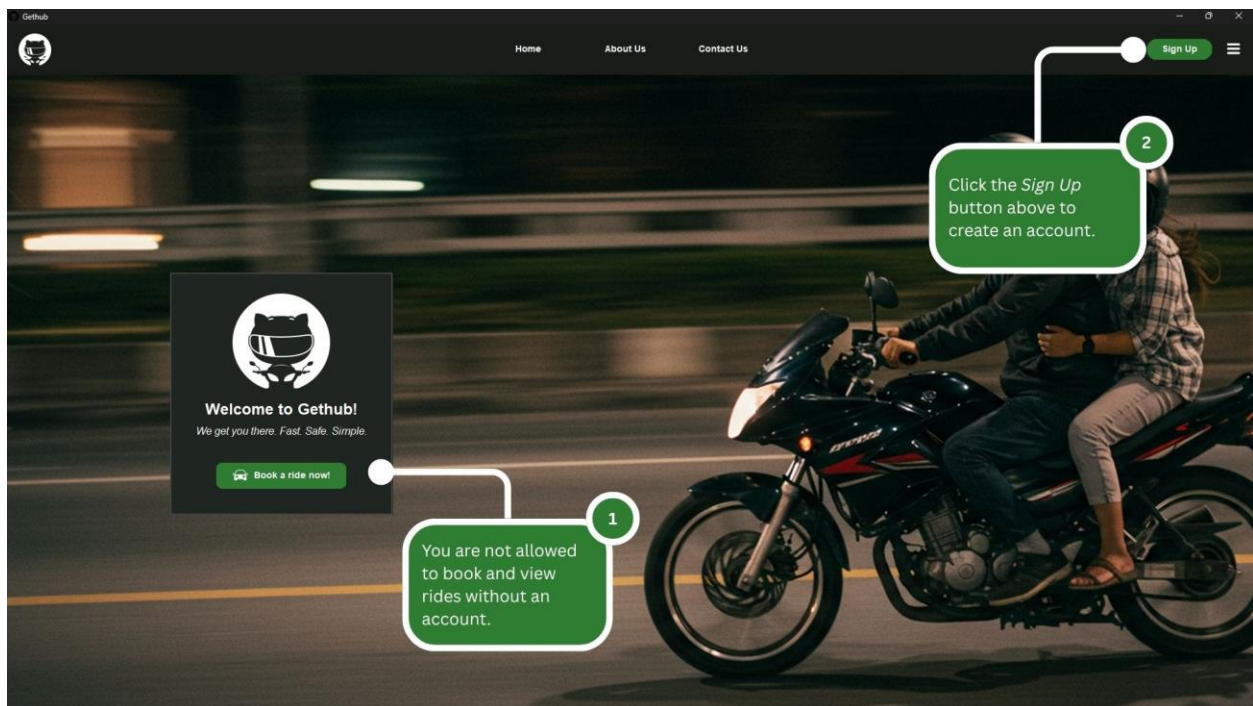


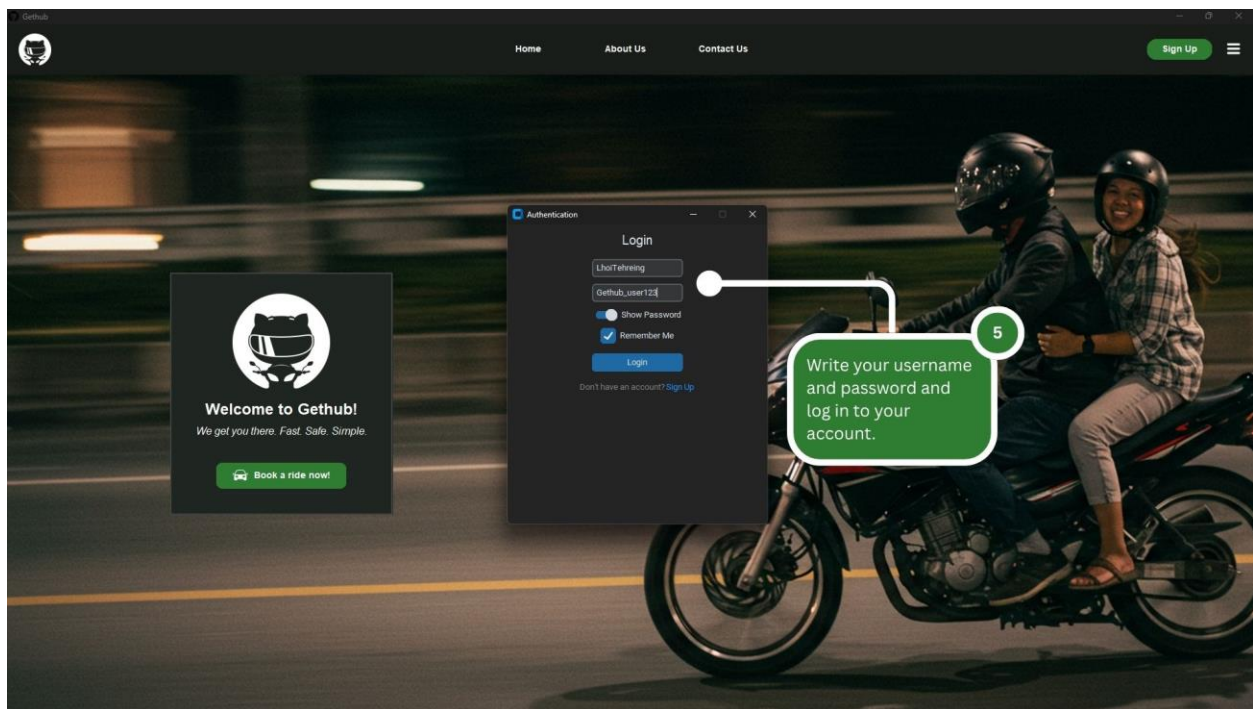
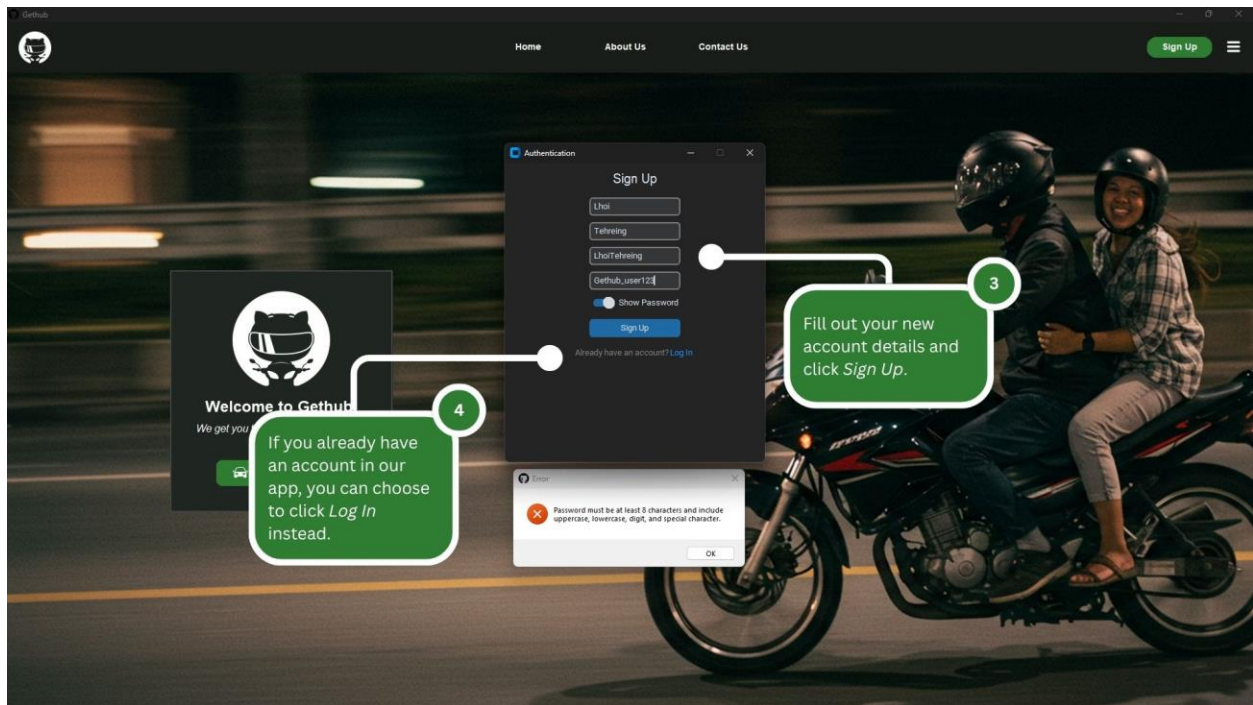


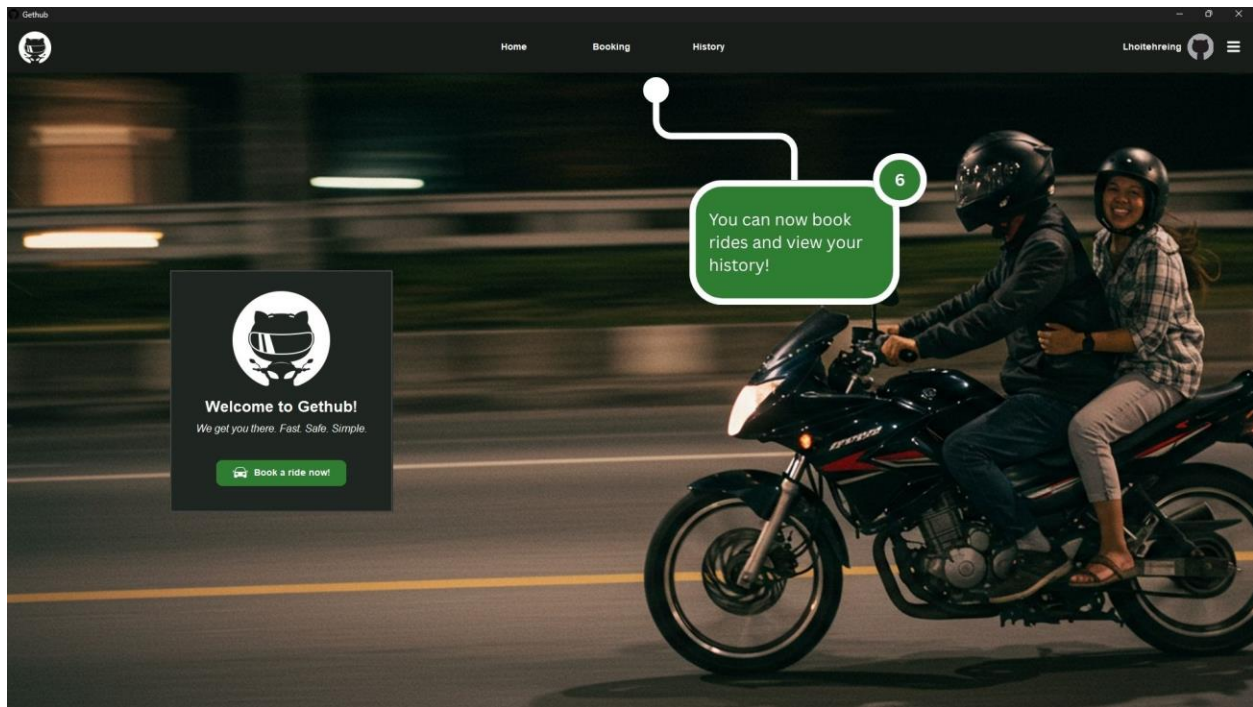




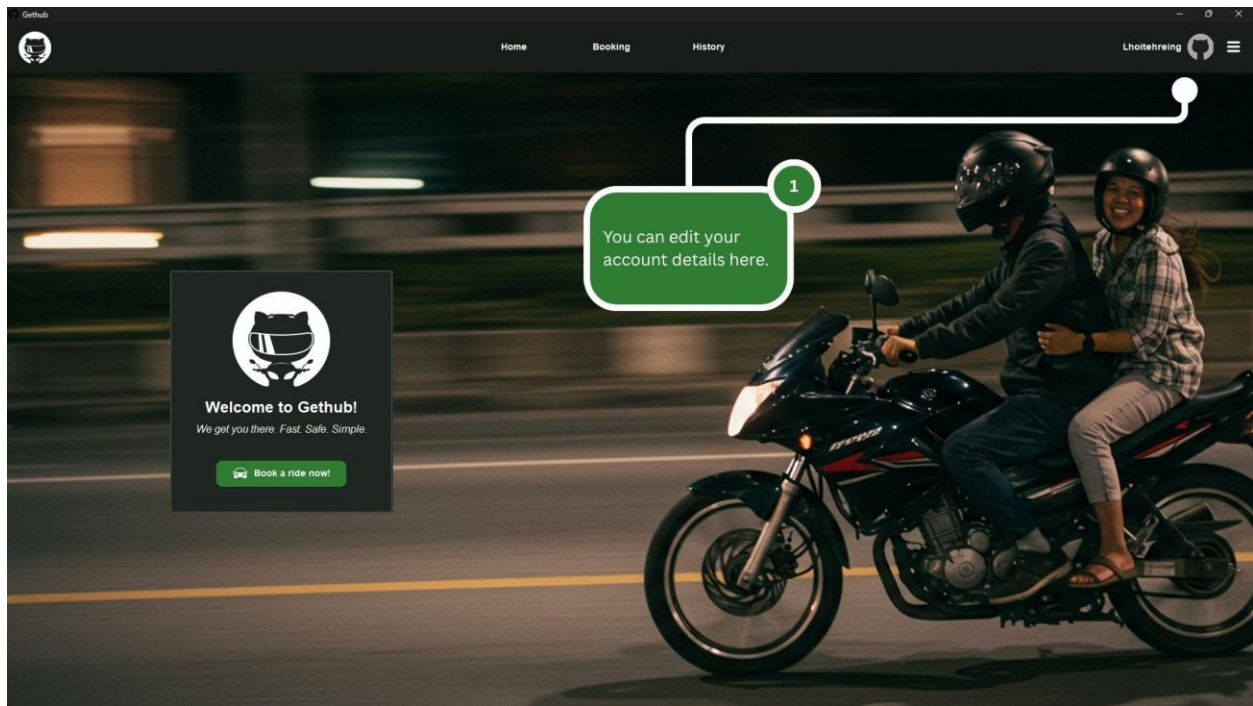
New user sign-up guide

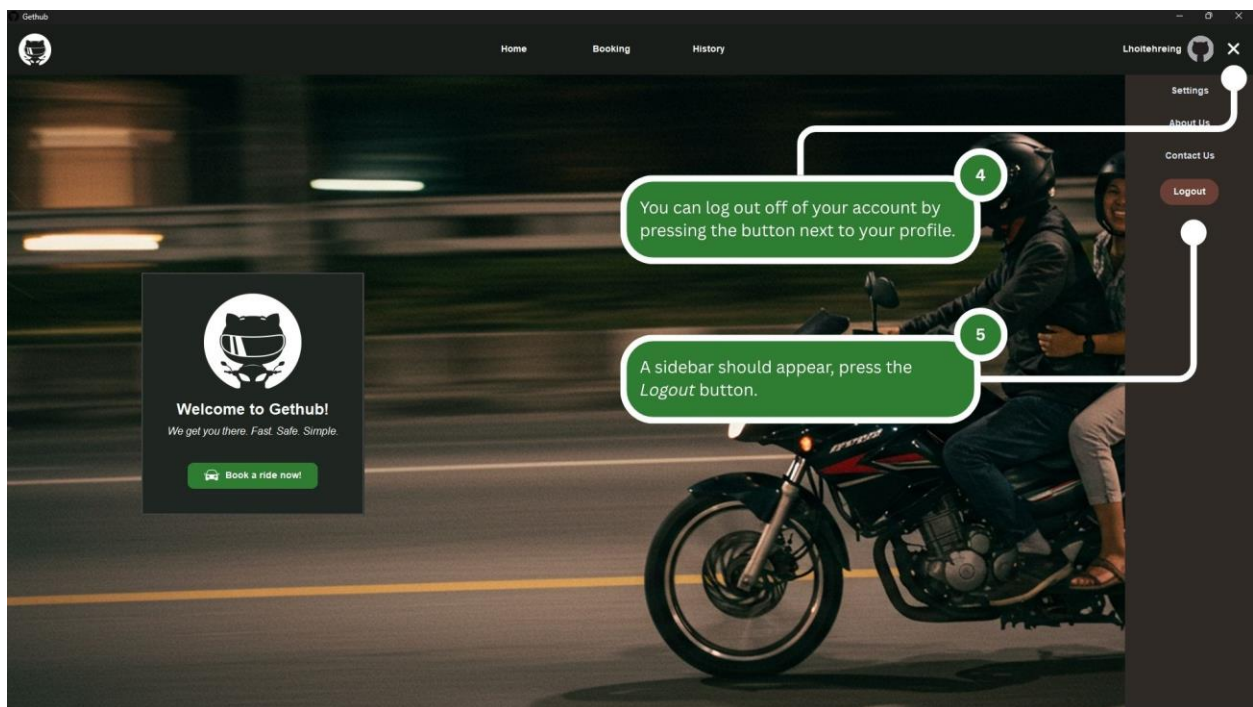
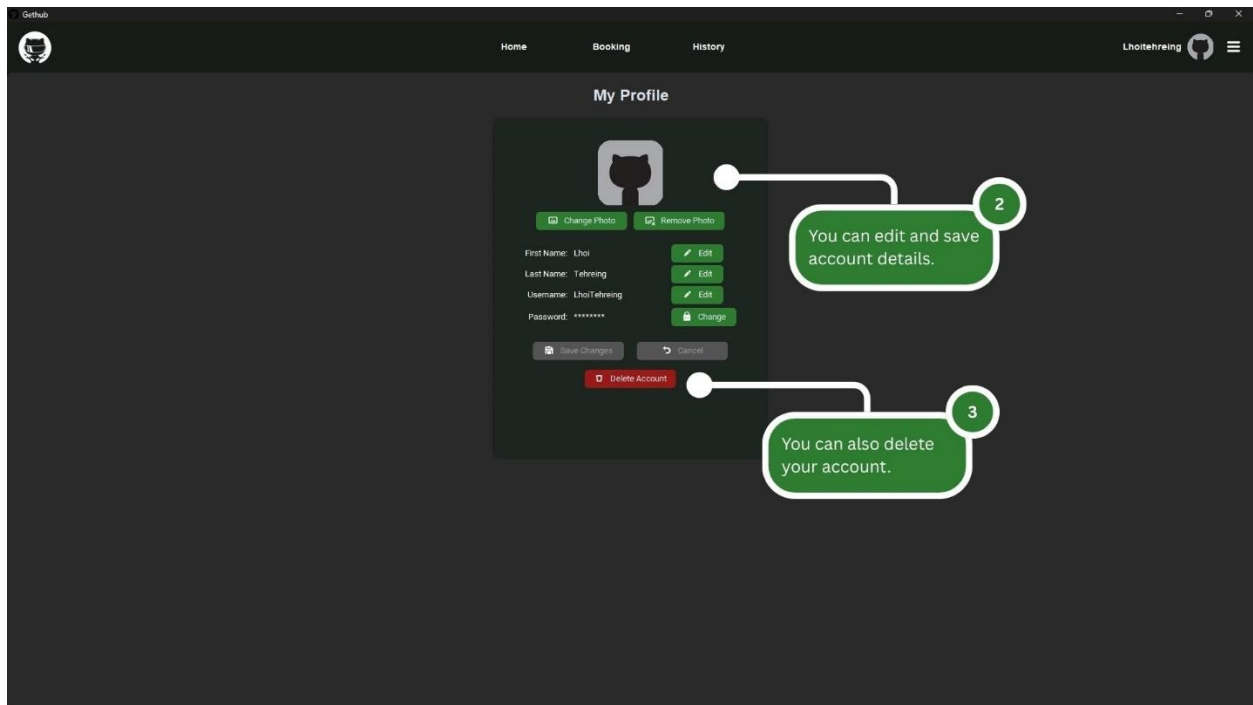






Account customization guide





Booking and confirming rides guide

Book a Ride!

Select a pickup destination
Mercury Drug, Juan Sumulong Street, San Roque, Antipolo, Rizal, Calabarzon, 1910, Philippines

Select a dropoff destination
Marcos Highway, Masinag, Mayamot, Antipolo, Rizal, Calabarzon, 1870, Philippines

Select a vehicle
☒ Car (4-seater)
☐ Van (12-seater)
☐ Motorcycle (2-seater)

Import booking
Clear booking

Next

Annotations:

- 1: Enter a pickup and dropoff destination.
- 2: Alternatively, you can right click on the map and manually place markers.
- 3: Select a vehicle type.
- 4: Once all of the required details are entered, you can click Next.

Book a Ride!

Select a pickup destination
Search for a destination...

Select a dropoff destination
Search for a destination...

Select a vehicle
☐ Car (4-seater)
☐ Van (12-seater)
☐ Motorcycle (2-seater)

Import booking
Clear booking

Next

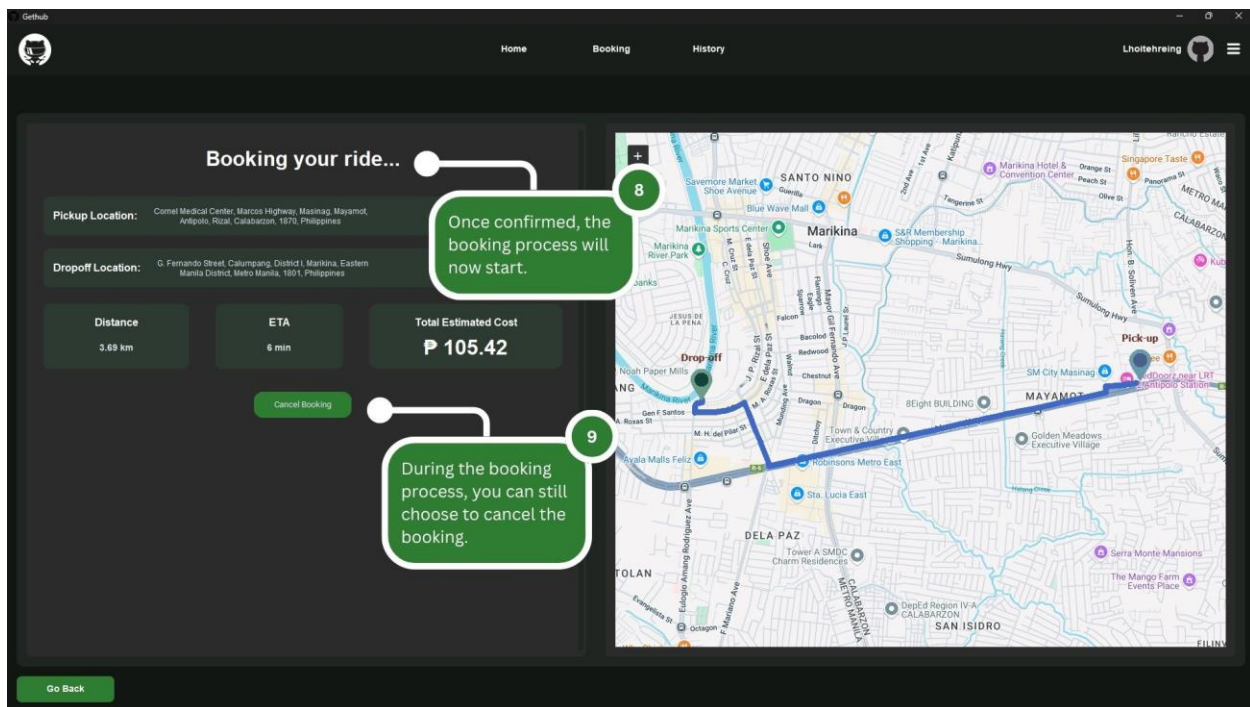
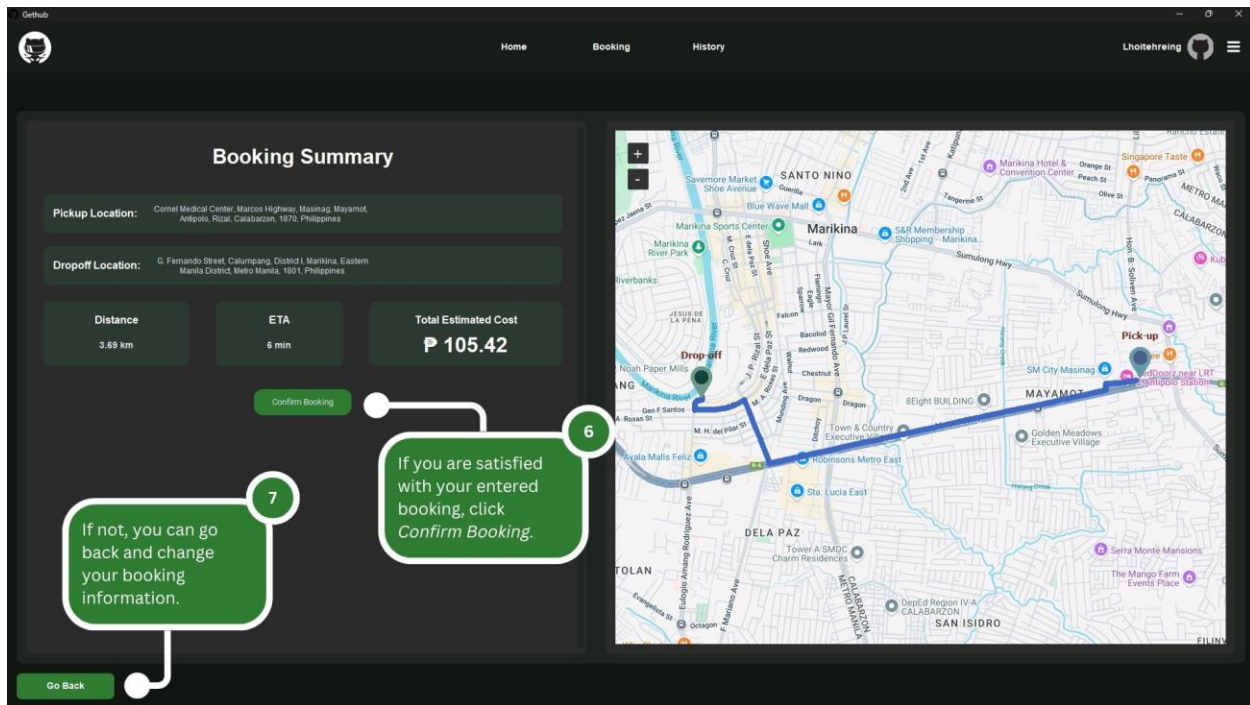
Annotation 5: If you decide to import a booking from a previous session, a file dialog will pop-up. Select your saved booking.

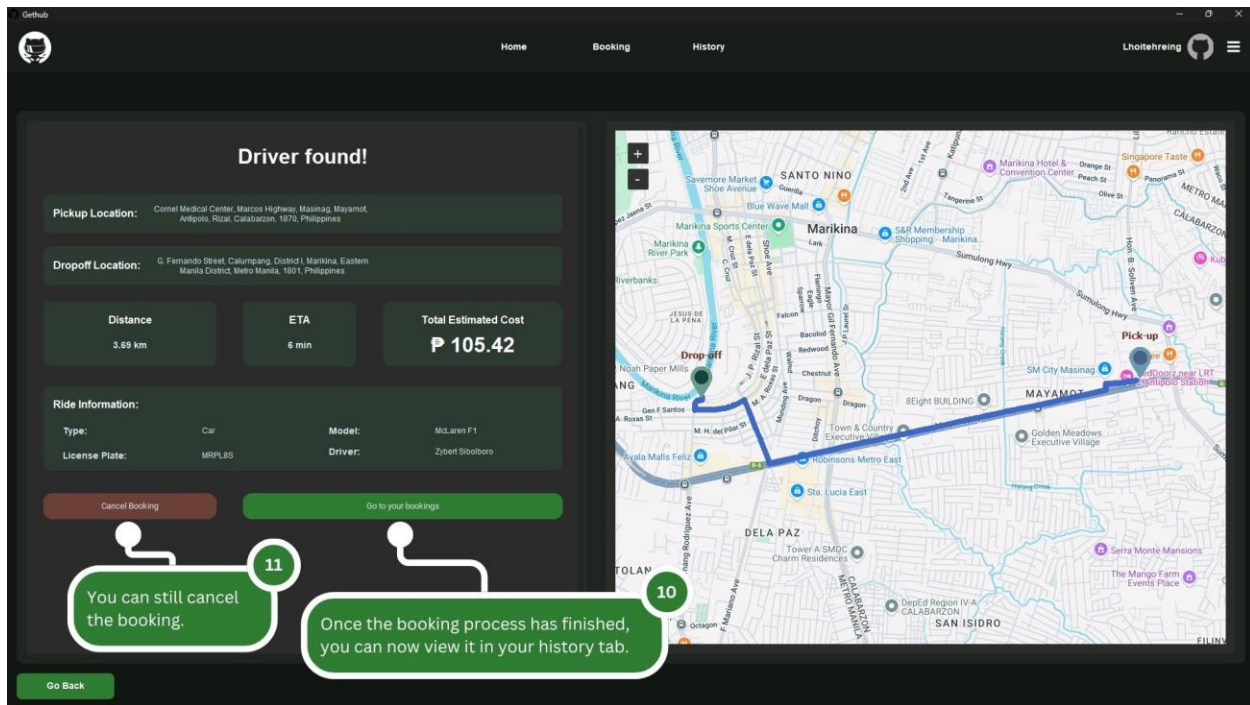
File Dialog:

Select a booking file

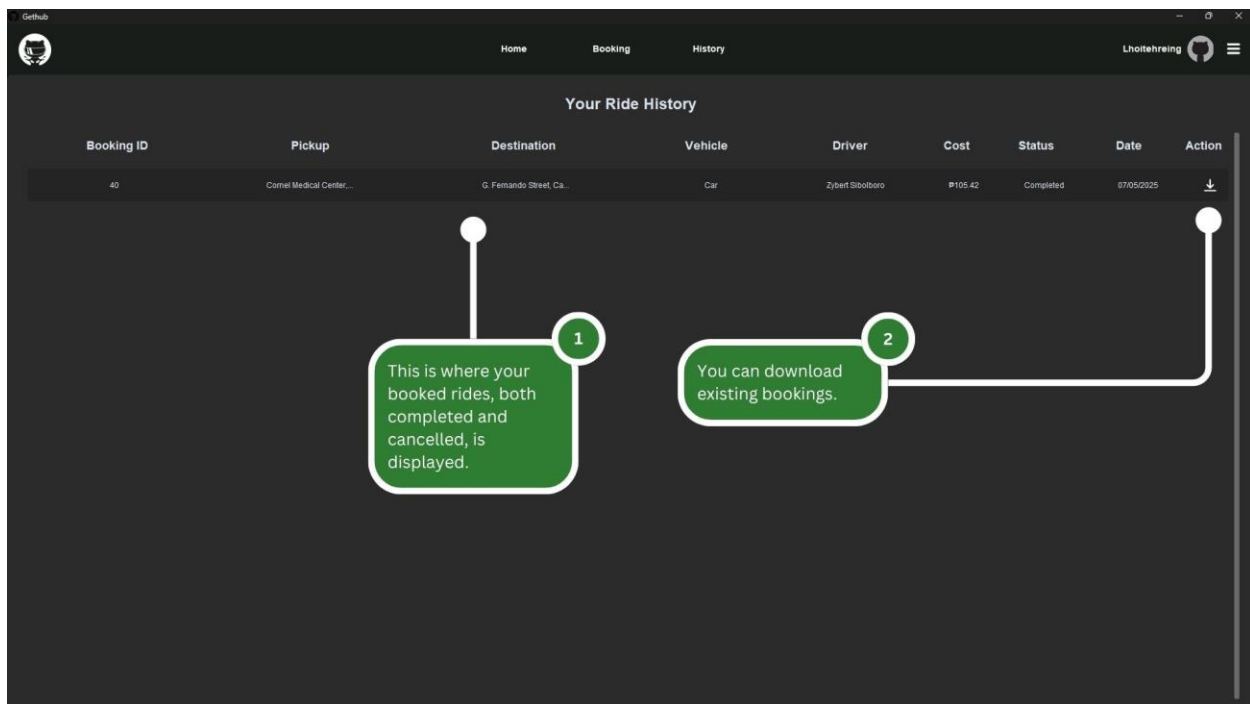
Name	Date modified	Type	Size
test_booking_0.json	7/4/2025 8:36 AM	JSON File	1 KB
test_booking_1.json	7/4/2025 8:36 AM	JSON File	1 KB

File name: JSON files (*.json)
Open Cancel





Viewing and downloading booking history guide



GetHub

HomeBookingHistory

Lhoitehreing

Your Ride History

Booking ID	Pickup	Destination	Vehicle	Driver	Cost	Status	Date	Action
42	Cornel Medical Center...	G. Fernando Street, Ca...	Car	Zybert Sibolboro	¥105.42	Completed	07/05/2025	↓

3

A file dialog will pop up should you choose to download a booking. Save your booking at a folder of your choosing.

Save As

Personal (D:) > Coding Endeavors > ride-bookingsystem > tests

Organize

New folder

Name	Date modified	Type	Size
test_booking_0.json	7/4/2025 8:56 AM	JSON File	1 KB
test_booking_1.json	7/4/2025 8:56 AM	JSON File	1 KB

This PCWindows OS (C:)Network

file name: booking_42.json

Save as type: JSON files (*.json)

SaveCancel

Wireframes

