

PURBANCHAL UNIVERSITY



DEPARTMENT OF COMPUTER ENGINEERING KHWOPA ENGINEERING COLLEGE LIBALI-08, BHAKTAPUR

A FINAL REPORT ON FOOD DELIVERY SYSTEM [GRUBMATE]

*Project work submitted in partial fulfillment of the requirements for the degree of
Bachelor of Engineering in Computer Engineering(Fifth Semester)*

Submitted by

Aashish Basnet	(790301)
Pratik Sharma	(790329)
Sakshyam Shrestha	(790334)
Sandesh Pandit Chhetri	(790337)

Under the Supervision of
Er. Reena Manandhar

Khwopa Engineering College
Libali-08, Bhaktapur
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BONAFIDE CERTIFICATE

This is to certify that the project entitled "**FOOD DELIVERY SYSTEM [GRUB-MATE]**" submitted by **Aashish Basnet (790301)**, **Pratik Sharma (790329)**, **Sakshyam Shrestha (790334)**, **Sandesh Pandit Chhetri (790337)** in partial fulfillment of the requirements for the award of the degree of **Bachelor of Engineering in Computer Engineering** of Purbanchal University, is a bonafide work to the best of our knowledge and may be placed before the examination board for their consideration.

Panel Of Examiners:

Signature

1. External Examiner

Person 1 Name

Designation

Institute/University Name

Date: November 19th,2025

2. Supervisor

Er. Reena Manandhar

Senior Lecturer

Khwopa Engineering College

Date: November 19th,2025

3. Head of Department

Er. Bikash Kumar Chawal

HoD

Khwopa Engineering College

Date: November 19th,2025

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Aashish Basnet (790301)
Pratik Sharma (790329)
Sakshyam Shrestha (790334)
Sandesh Pandit Chhetri (790337)

Abstract

The Food Delivery System(Grubmate) is developed revolutionize the traditional food service industry by enhancing accessibility, efficiency, and customer satisfaction. The system is implemented using Django as the backend framework, supported by a relational database for efficient data management, and React for the frontend to provide a better user interface for customers. With features such as online food ordering, restaurant selection, and real-time order tracking, the system streamlines the entire process from browsing menus to food delivery. By optimizing restaurant operations and automating order management, it reduces wait times, minimizes errors, and improves overall service quality. In addition, the system provides insights into the restaurant's most-ordered food items, helping owners understand customer preferences and improve menu management. Through seamless integration of digital technologies, the Food Delivery System provides a cost-effective, scalable, and user-friendly solution, ensuring a convenient and efficient food ordering experience for both customers and restaurant owners.

Keywords:*Food Delivery, Order Management, Customer Experience, Tracking, Restaurant Optimization*

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Chapter 1

Introduction

1.1 Background Introduction

The food service industry is experiencing rapid transformation, shaped by advances in digital technologies and evolving consumer expectations. GrubMate, an integrated Food Delivery System, harnesses these technological breakthroughs to modernize how customers order food and how restaurants manage their operations. The platform provides a streamlined online interface where users conveniently browse menus from diverse food venues—ranging from small, local eateries to high-end fine dining establishments—place orders, and track deliveries in real-time.

Crucially, GrubMate is designed to provide equal opportunities for all types of restaurants. Small and local vendors benefit from enhanced market visibility alongside established brands, resulting in a level playing field where unique and diverse culinary offerings can reach broader audiences. This inclusive approach not only stimulates local economic growth but also promotes culinary diversity, enriching the food delivery ecosystem for all stakeholders.

Real-time tracking and automated notifications increase transparency and build user trust, while the platform helps restaurant owners identify their most-ordered food items, enabling better understanding of customer preferences and improved menu management. The platform's intuitive design reduces errors, simplifies workflows, and fosters clear communication between customers, restaurants, and delivery partners. Ultimately, GrubMate elevates efficiency, inclusivity, and satisfaction within the food delivery landscape.

1.2 Motivation

GrubMate is motivated by the need to resolve lingering challenges in food delivery: inconsistent service reliability, communication breakdowns, and inequitable restaurant representation. Traditional systems often result in delayed deliveries, order errors, and limited exposure for smaller restaurants struggling to compete with larger market leaders.

The platform proactively addresses these issues by leveraging a robust, technology-driven approach that integrates all stakeholders onto a single platform. Real-time data analytics and automated process flows improve operational efficiency, catering to the increased demand for speed and accuracy among modern consumers. Importantly, GrubMate removes barriers to entry for local businesses, ensuring that both celebrated fine dining spots and emerging neighborhood kitchens benefit equally from digital transformation.

By focusing on user-centric, scalable solutions, GrubMate reshapes the food delivery experience—making it more accessible, efficient, and fair for all parties involved.

1.3 Problem Definition

Despite substantial progress in digital adoption, the food service sector continues to face persistent obstacles: ineffective order management, suboptimal logistics, and limited customer engagement. Legacy processes—often manual or semi-automated—yield frequent mistakes, extended wait times, and lack of real-time visibility, which diminish satisfaction for both customers and restaurant owners.

Small and local restaurants, in particular, encounter hurdles when trying to compete with larger, well-funded counterparts, struggling for attention in saturated markets. Meanwhile, consumers express frustration over the absence of an integrated system providing timely updates and seamless service.

GrubMate directly addresses these pain points by delivering an accessible, automated, and data-driven solution that minimizes errors, streamlines order workflows, and brings fair representation to a broad spectrum of food providers—ensuring a seamless, rewarding delivery experience for all.

1.4 Objectives

The main objective of this project is:

- Develop an integrated Food Delivery System that seamlessly connects customers, restaurants (both local and fine dining), and delivery partners through a unified platform.

1.5 Scope and Applications

The scope of the GrubMate food delivery system covers online food ordering, restaurant management, delivery tracking, payment processing, and customer engagement. The system serves three key stakeholders: customers, merchants (restaurants and delivery personnel), and administrators. Customers use the platform to browse menus, place orders, and track deliveries; merchants manage profiles, menus, inventory, and delivery tasks; and administrators oversee system operations, user management, and data integrity. This scope ensures seamless interaction, efficient resource use, and scalability.

Applications of the GrubMate food delivery system:

- **Restaurant and Delivery Management:** Streamlining menu updates, order processing, kitchen operations, inventory management, and delivery assignments to improve service efficiency and optimize workflow.
- **Food Delivery Services:** Enhancing online food ordering, real-time delivery tracking, and secure payment systems to provide a smooth and convenient experience for customers.
- **Customer Engagement:** Offering personalized recommendations, loyalty rewards, and promotional deals to improve customer retention and satisfaction.
- **Administrative Oversight:** Allowing system administrators to manage users, monitor platform performance, and ensure data security and operational integrity.

Chapter 2

Literature Review

In recent years, the food service industry has undergone a significant transformation, driven by technological advancements and a growing emphasis on convenience and customer-centric experiences. The emergence of innovative food delivery systems has revolutionized how people order food, allowing them to seamlessly access restaurant services while optimizing operational efficiency for businesses.

Today, food delivery platforms play a crucial role in enhancing the dining experience by offering a wide range of features tailored to meet the diverse needs of customers and restaurant owners alike. Some of the most influential platforms in this space include Foodmandu, BhojDeals, and Pathao Food, each contributing to the evolution of traditional restaurant models through cutting-edge technology and personalized solutions.

- **Foodmandu:** Nepal's leading online food delivery service, allowing customers to order food from a variety of restaurants via its app and website. With features like real-time order tracking, multiple payment options, and exclusive discounts, Foodmandu enhances the ordering experience while supporting restaurant partners [1].
- **BhojDeals:** Provides an integrated platform for food delivery and dining discounts, offering customers exclusive deals on meals from partnered restaurants. By combining delivery with promotions, BhojDeals helps users enjoy meals at reduced prices [2].
- **Pathao Food:** A growing player in Nepal's delivery market, enabling users to order from a wide range of restaurants with fast delivery. Its integration with Pathao's ride-sharing platform ensures efficient logistics, making delivery more accessible and reliable [3].

Considering the rapid advancements in food delivery platforms, our developed system seeks to leverage technology to enhance the efficiency of restaurant operations and improve customer satisfaction. Existing platforms such as Foodmandu, BhojDeals, and Pathao Food have introduced features like real-time order tracking, personalized recommendations, easy cart management, and competitive pricing, which have significantly reshaped customer expectations in the industry. However, these platforms also reveal gaps in seamless restaurant-delivery coordination and user experience consistency.

Building on these insights, our system is designed as a comprehensive food delivery platform that empowers diners to make informed choices, access tailored restaurant suggestions, and enjoy a streamlined ordering process. This chapter therefore reviews the contributions of existing food delivery systems and establishes the foundation for our proposed solution, which aims to bridge the gap between diners and restaurants through a more integrated, tech-driven approach.

Chapter 3

Requirement Analysis

This chapter presents the requirements essential for the design and development of the GrubMate Food Delivery System. These requirements were identified based on system objectives, stakeholder expectations, and the operational workflow of customers, merchants, delivery personnel, and administrators.

3.1 Software Requirements

Development Environment

- Python 3.10 or later
- Django Framework with Django REST Framework
- SQLite Database (default Django relational database)
- Django Channels for real-time communication
- React.js with Node.js (v16+)
- Visual Studio Code
- Git and GitHub for version control
- Postman/Thunder Client for API testing

Runtime Environment

- Windows, Linux, or macOS
- Any modern web browser (Chrome, Firefox, Edge)

3.2 Hardware Requirements

Minimum Specifications

- Dual-core processor
- 4 GB RAM
- 10 GB available storage
- Stable internet connection

Recommended Specifications

- Quad-core processor
- 8 GB RAM or higher
- SSD storage

3.3 Functional Requirements

Customer Module

- User account registration and authentication
- Browsing of restaurants, menus, and food categories
- Cart management and order placement
- Real-time order status tracking
- Profile and account management

Restaurant (Merchant) Module

- Restaurant registration and verification workflow
- Menu creation, modification, and deletion
- Access to incoming customer orders
- Updating of order preparation status

Delivery Personnel Module

- Delivery personnel registration and approval
- Viewing assigned delivery tasks
- Updating delivery progress (picked up, in transit, delivered)
- Access to delivery details such as customer address and order information

Admin Module

- Management of customers, merchants, and delivery personnel
- Approval and monitoring of restaurant and delivery applications
- Oversight of system data and operational activities
- Ensuring compliance and platform integrity

3.4 Non-Functional Requirements

The non-functional requirements define the quality attributes and operational constraints of the GrubMate Food Delivery System. These requirements ensure system reliability, usability, performance, and long-term maintainability.

Performance Requirements

- The system is designed to support simultaneous access from multiple users without performance degradation.
- API endpoints are optimized to ensure efficient request processing under typical traffic conditions.
- Page rendering and data retrieval operations are expected to maintain acceptable response times during peak usage.

Security Requirements

- All user credentials are stored using secure hashing mechanisms as enforced by Django's authentication framework.
- Access to system resources is regulated through authenticated and role-based authorization mechanisms.
- The system incorporates preventive measures against common web vulnerabilities, including CSRF, XSS, and SQL injection attacks.

Usability Requirements

- The user interface is designed to ensure consistent user experience across various devices and screen resolutions.
- Navigation flows and interface components follow standardized design patterns to promote user efficiency and reduce operational complexity.
- Visual hierarchy, color schemes, and layout arrangements maintain clarity and accessibility across all modules.

Reliability and Availability

- The system maintains stable operation during continuous usage, ensuring uninterrupted access to core functionalities.
- Transactional integrity is preserved during order placement, status updates, and delivery operations.
- Data reliability is maintained through Django's built-in atomic operations and consistent database handling.

Scalability Requirements

- The system architecture supports expansion in terms of additional users, restaurants, and delivery personnel.
- Migration from SQLite to a production-grade relational database is feasible when higher throughput is required.
- The modular backend structure facilitates horizontal scaling of services in future deployments.

Maintainability Requirements

- The system codebase follows modular architectural principles, enabling isolated updates to individual components.
- Proper documentation is maintained for APIs, system workflows, and major modules to support future enhancements.
- The framework and libraries used are open-source and widely supported, ensuring long-term maintainability.

Compatibility Requirements

- The system is compatible with major web browsers including Chrome, Firefox, and Edge.
- The frontend is responsive and adapts to Android and iOS screen dimensions.
- The platform's design ensures interoperability across different operating systems in both development and deployment environments.

3.5 Summary

This chapter summarized the software, hardware, functional, and non-functional requirements necessary for the successful development of the GrubMate Food Delivery System. These requirements form the foundation for the system's design and implementation.

Chapter 4

Feasibility Study

4.1 Technical Feasibility

GrubMate is developed using a reliable and well-supported technology stack consisting of Django, React, and Django REST Framework, ensuring scalability, maintainability, and security across all system modules. The project uses SQLite as its database management system, offering lightweight, efficient, and file-based data storage suited for development and medium-scale applications. SQLite provides strong transactional support, ACID compliance, and reliable performance for managing structured datasets such as customer orders, restaurant menus, and delivery records. Its zero-configuration architecture and seamless integration with Django enhance development efficiency while maintaining data integrity. Supported by extensive documentation and active developer communities, this technology stack enables smooth integration, future enhancements, and sustainable long-term operation.

4.2 Operational Feasibility

The system is designed for broad usability and accessibility, requiring only standard computing devices such as desktop computers, laptops, or smartphones. Its intuitive and user-centered interface minimizes training requirements and enables efficient use by customers, restaurant operators, and delivery personnel. With minimal hardware demands, the system performs effectively on typical consumer devices, ensuring widespread operational reach. The workflow design follows established usability principles, enabling seamless day-to-day operations and reducing manual effort. Through automated processes and well-organized task flows, GrubMate improves operational efficiency while minimizing the likelihood of errors during order processing or delivery coordination.

4.3 Economic Feasibility

The development of GrubMate is cost-effective due to its reliance on open-source frameworks and tools, eliminating expenses associated with licensing or subscription-based software. The use of freely available development platforms, servers, and libraries further reduces overall project expenditure. Additionally, the system's automation capabilities—such as streamlined order management and coordinated delivery tracking—offer long-term economic benefits for restaurants and delivery partners. These efficiencies reduce labor overhead, minimize human errors, and support better resource utilization. As a result, GrubMate presents an economically viable solution for businesses of varying sizes and operational capacities.

4.4 Scheduling Feasibility

The project follows a structured development timeline aligned with academic and operational milestones, with an estimated completion period of approximately five months. Development activities are managed using Agile methodologies, enabling iterative progress, regular reviews, and consistent refinement based on feedback. This approach supports timely identification of issues and rapid adaptation to evolving requirements. The project schedule incorporates risk mitigation measures and contingency planning, ensuring that potential delays are addressed proactively. Overall, the planned timeline supports successful, timely completion of the system within the allotted duration.

4.5 Security Feasibility

Security forms a critical component of the GrubMate platform, ensuring the confidentiality, integrity, and availability of user data and system resources. Secure authentication mechanisms, encrypted data handling, and role-based access control are implemented to protect against unauthorized access. The platform safeguards transaction integrity through secure communication channels and adherence to industry-standard practices. Defensive measures are integrated into the backend to mitigate risks from common vulnerabilities such as SQL injection, cross-site scripting (XSS), and cross-site request forgery (CSRF). Periodic security assessments, vulnerability checks, and adherence to recognized security guidelines strengthen the system's resilience. These practices ensure a safe and trustworthy operational environment for customers, restaurants, and delivery partners.

4.6 Maintenance Feasibility

GrubMate is built using modular and widely supported technologies such as Django and React, enabling straightforward maintenance, updates, and scalability. Comprehensive documentation—including system architecture, API specifications, and user guides—supports ongoing maintenance and onboarding of future developers. The modular code structure facilitates efficient implementation of new features, timely bug fixes, and isolated improvements without disrupting the entire system. Maintenance plans incorporate scheduled database backups, performance monitoring, and version control management to ensure system reliability and quick recovery from unexpected issues. With provisions for scaling hardware or integrating cloud services as demand grows, the system demonstrates strong long-term maintainability and adaptability.

Chapter 5

Methodology

5.1 Background

The GrubMate Food Delivery System, is developed as a comprehensive platform integrating multiple user interfaces to deliver a seamless food ordering and delivery experience. It supports three primary user roles—customers, restaurant owners, and delivery personnel—each served by dedicated modules tailored to their specific needs and workflows.

On the client side, GrubMate features a responsive and interactive frontend developed with React. This modern JavaScript library enables fast navigation, real-time updates, and an intuitive user interface. Customers can easily browse diverse restaurant menus, customize orders, add items to their cart, and complete transactions efficiently. The responsive design ensures accessibility across devices, enhancing the overall user experience.

The restaurant module comprises a robust management dashboard designed for restaurant owners. This dashboard facilitates profile maintenance, menu updates, order tracking, and customer engagement monitoring. By streamlining order processing and inventory management, the dashboard helps restaurants optimize operational efficiency and maintain consistently high service quality.

The delivery personnel module features a dedicated interface that supports order assignment, route navigation, and real-time delivery status updates. Delivery agents receive automated order notifications, optimized route guidance using navigation API's, and tools to update order progress, such as pickup and delivery confirmations. This module fosters efficient logistics, reduces delivery times, and maintains clear communication between delivery personnel, restaurants, and customers.

At the core, the backend is powered by Django and Django REST Framework, which handle critical business logic including order management, user authentication, delivery assignment, and data storage. This backend framework provides a secure, scalable, and maintainable environment that effectively coordinates communication between frontend and database components while supporting future system expansion.

GrubMate's modular architecture not only optimizes food delivery workflows by minimizing delays and errors but also fosters transparent and reliable interactions among customers, restaurants, and delivery agents. This scalable design positions GrubMate as a competitive and user-friendly solution in the evolving food delivery landscape.

5.2 Algorithm

The following algorithm outlines the internal operational flow of the Food Delivery System, GrubMate. It describes how the system processes user interactions, manages restaurant activities, and coordinates delivery operations.

1. The system initializes and loads the home page containing food delivery options.
2. The system displays available restaurants, menus, prices, and promotional offers.
 - Customers are able to browse menu items and add selected items to their cart.
 - The cart is automatically updated as quantities are modified.
 - The system computes the total amount, including taxes and applicable discounts.
 - Delivery address details are retrieved or added as required.
 - Customers select a delivery time (immediate or scheduled).
 - Available payment methods are displayed for order confirmation.
 - The system processes the payment and records the transaction status.
 - A unique order ID is generated upon successful order placement.
 - The customer receives notifications regarding order acceptance and estimated delivery time.
 - Real-time delivery tracking updates are provided throughout the process.
 - After completion, the customer may submit ratings and feedback.
3. User authentication (registration or login) is performed.
 - New users provide required personal information to create an account.
 - Returning users log in using credentials, after which their stored preferences and details are retrieved.
4. The admin panel manages overall system coordination.
 - Administrators monitor active orders and system performance.
 - Customer feedback is reviewed for quality improvements.
 - Restaurant availability, menu updates, and operational data are maintained.
5. The system continues operation until all processes are complete and the session is terminated.

5.3 Block Diagram

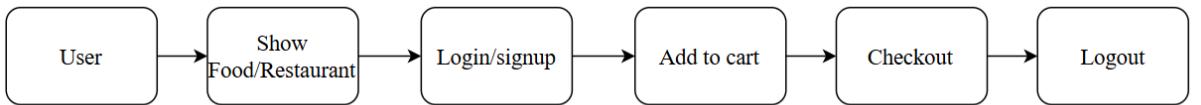


Figure 5.1: Block Diagram User Side

The User Side block diagram represents the Customer Module of GrubMate. It illustrates how customers interact with the system through features such as browsing restaurant menus, adding items to the cart, logging in or signing up, placing orders, making secure payments, and tracking deliveries in real time. This module highlights the customer-facing functionalities that ensure a smooth, convenient, and engaging food ordering experience.

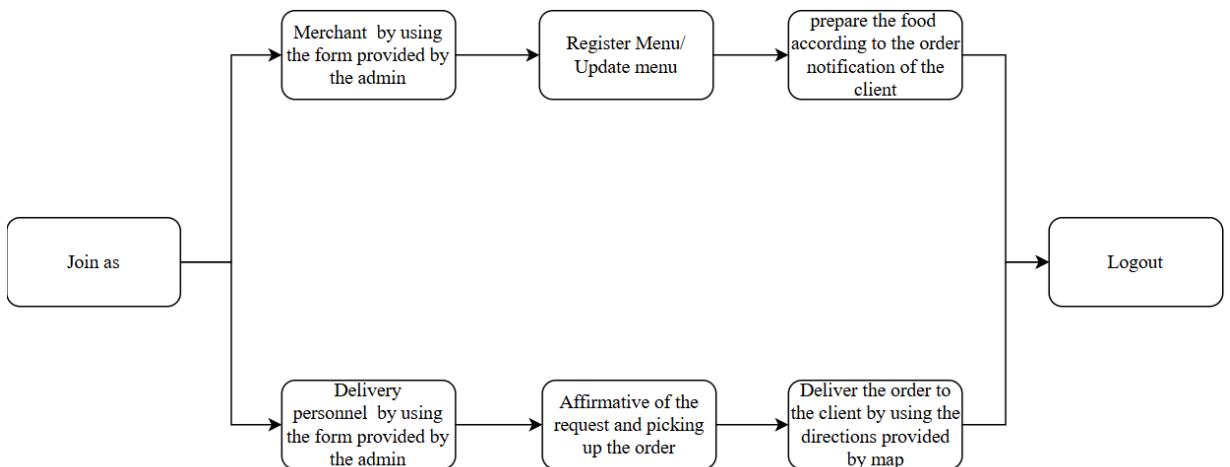


Figure 5.2: Block Diagram Merchant Side

The Merchant Side block diagram combines both restaurant and delivery personnel functionalities under the Merchant Module. It depicts how restaurants register on the platform, manage their profiles, update menus, and process orders, while delivery personnel register, receive order assignments, pick up items from restaurants, and update delivery status during real-time tracking. This block diagram emphasizes the seamless coordination between restaurants and delivery agents, ensuring efficient and timely order fulfillment.

5.4 Flow Chart

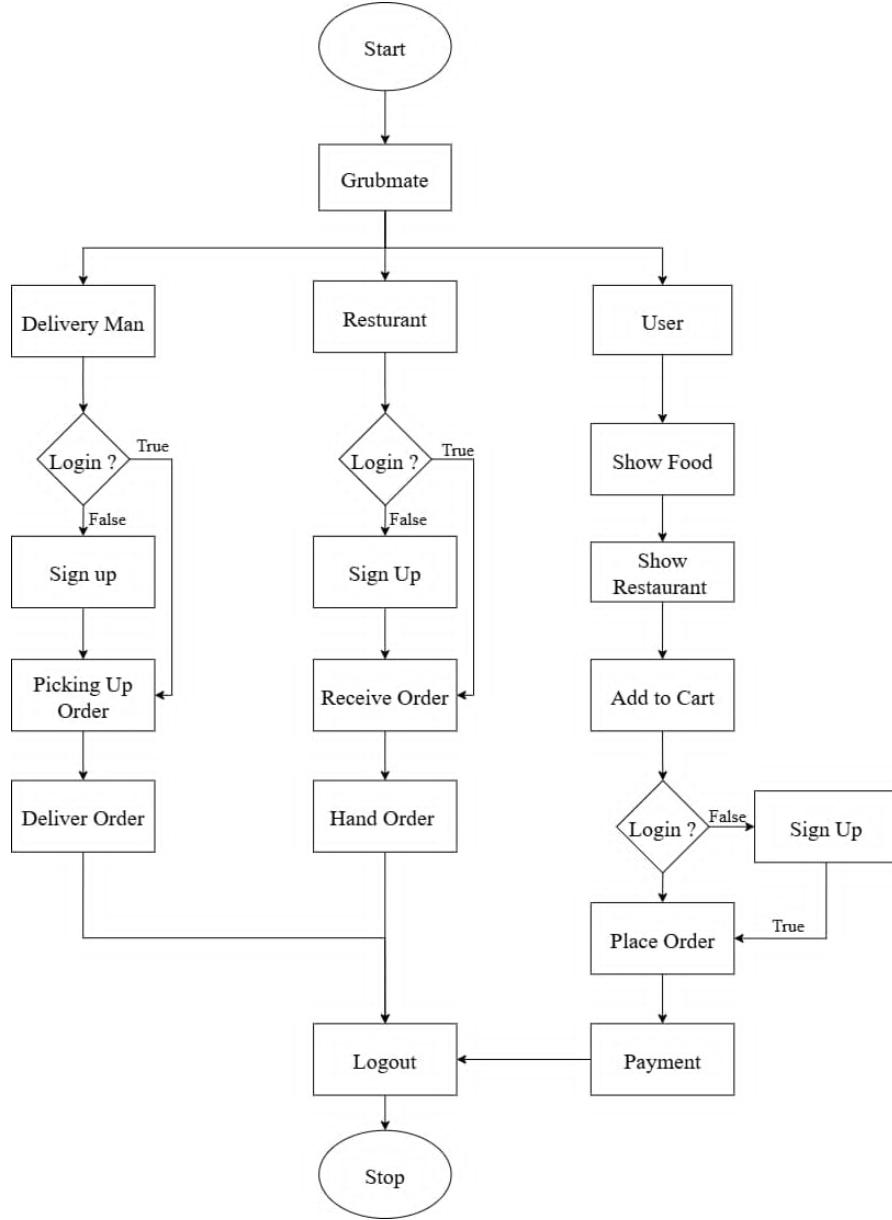


Figure 5.3: Flow Chart of the Food Delivery System

The flowchart illustrates the overall workflow of the GrubMate Food Delivery System, covering the interactions among three primary user roles: **User**, **Restaurant**, and **Delivery Man**. Each role accessed the system through its respective module and performed tasks according to its responsibilities.

- **User (Client/Customer):** The user began by browsing the available restaurants and food items on the platform. They selected preferred dishes and added them to the shopping cart. Before placing an order, the user was required to log in or register if they were a new customer. After authentication, the user confirmed the order, completed the payment process, and received confirmation. The order was then forwarded to the restaurant for preparation. Once the interaction was

complete, the user could log out of the system.

- **Restaurant:** The restaurant workflow started with the restaurant owner or staff logging into the system or signing up if they were new. After successful login, the restaurant received incoming customer orders, prepared the meals, and updated the order status. Once the food was ready, it was handed over to the assigned delivery personnel. After fulfilling all required tasks, the restaurant user could log out.
- **Delivery Man:** The delivery personnel began by logging into the system or registering if they were new to the platform. After authentication, the delivery man retrieved the assigned order details and proceeded to the designated restaurant to collect the prepared food. The delivery agent then transported the order to the customer's location and updated the delivery status throughout the process to ensure transparency. After completing the delivery, the delivery man logged out of the system.

5.5 ER-Diagram

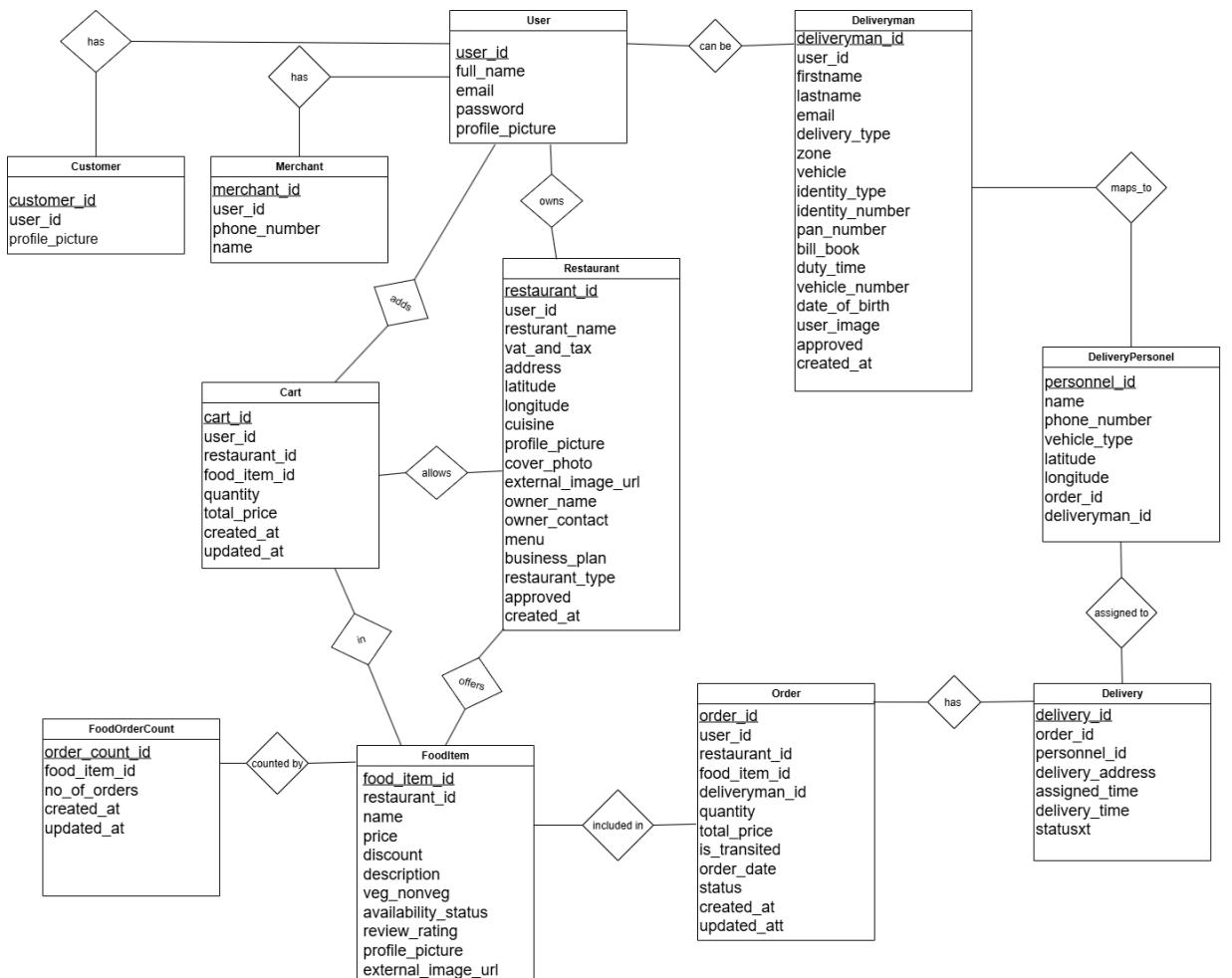


Figure 5.4: Entity-Relationship Diagram of the System

The Entity–Relationship (ER) diagram of the GrubMate Food Delivery System illustrates the major entities involved in the platform and the relationships that enable efficient management of users, restaurants, food items, orders, and deliveries. The design is structured to support modularity, scalability, and clear separation of responsibilities across system components.

- **User:** The central entity representing all individuals registered on the platform. A user can assume one of three roles—*Customer*, *Merchant*, or *Deliveryman*—through one-to-one relationships, allowing a unified authentication and profile management system.
- **Customer:** Represents users who browse restaurants, add food items to their cart, and place orders. Customers interact with cart, order, and delivery entities throughout the food ordering process.
- **Merchant:** Represents users responsible for managing a *Restaurant*. Each merchant owns exactly one restaurant and oversees menu updates, food item availability, and order processing.
- **Restaurant:** Stores restaurant-specific information such as name, location, cuisine type, and business category. A restaurant can list multiple *FoodItems* and may receive multiple *Orders* from customers.
- **FoodItem:** Represents the menu items offered by restaurants. Each item includes attributes such as price, category, and availability. Food items are referenced in both the *Cart* and *Order* entities.
- **Cart:** Temporarily stores selected food items chosen by a customer prior to placing an order. Each cart entry corresponds to a user, restaurant, and a specific food item along with the chosen quantity.
- **Order:** Represents a finalized purchase made by a customer. It contains order details such as quantity, total cost, timestamps, and status. An order is linked to the associated customer, restaurant, food items, and optionally to a deliveryman when delivery is assigned.
- **Deliveryman:** Represents users who are responsible for delivering orders. Each deliveryman has additional details such as contact information and vehicle data, and can be linked to ongoing deliveries.
- **DeliveryPersonnel:** Tracks which order a deliveryman is currently handling. This entity supports real-time delivery assignment and monitoring.
- **Delivery:** Stores information related to the delivery process, including pickup time, delivery time, and current status. Each order has an associated delivery record.
- **FoodItemCount:** Maintains the number of times each food item has been ordered. This entity supports analytics and assists in generating recommendation-based features.

This ER design ensures a well-structured data model that enhances scalability, maintainability, and efficient system operation. The separation of entities and their relationships provides clear data flow and supports future system extensions without disrupting the core architecture.

5.6 Use Case Diagram

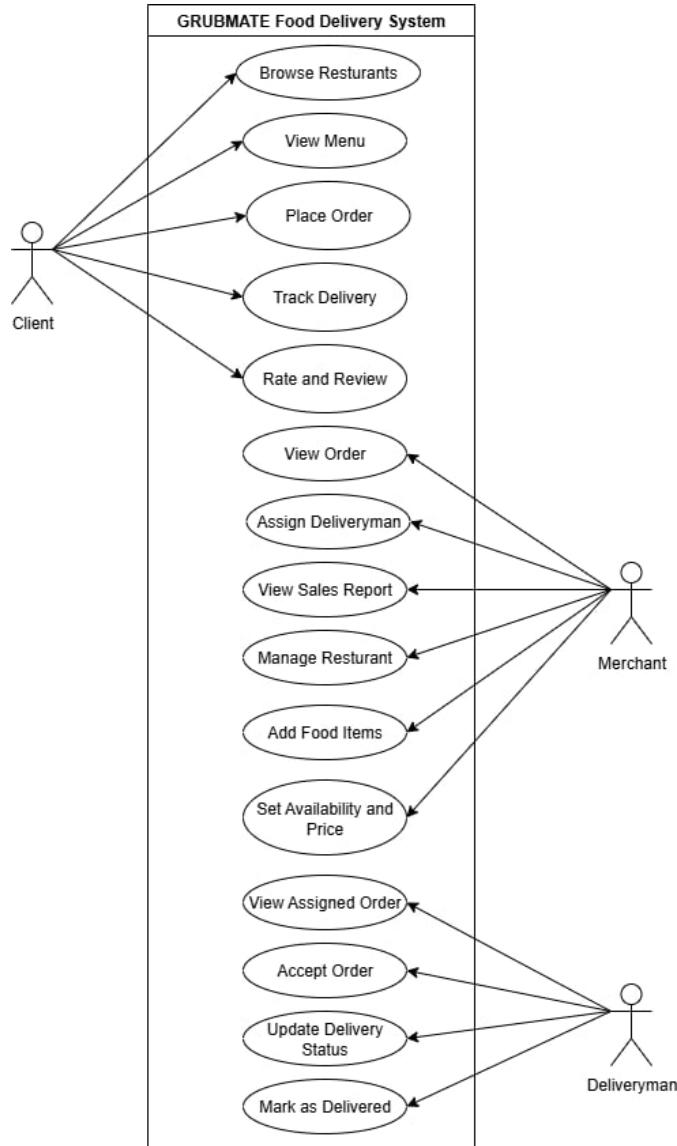


Figure 5.5: Use Case Diagram of the System

The use case diagrams illustrate the functional structure of the GrubMate Food Delivery System by presenting the workflows of three primary user groups: **User**, **Restaurant**, and **Delivery Man**. Each block diagram represents the major interactions and processes handled by each role.

- **User (Customer) Module:** This module represents the customer-facing features of the system. Customers could browse restaurant menus, view food items, explore available offers, and add selected dishes to the shopping cart. The module also allowed users to sign up or log in, place orders, make secure payments, and track the delivery status in real time. The block diagram highlighted the overall ordering workflow, ensuring a seamless and convenient experience for the user.
- **Restaurant(Merchant) Module:** This module displayed the operational activities handled by the restaurant. Restaurant owners or staff logged into the system to

manage their profiles, update menus, and handle incoming orders. Upon receiving an order, the restaurant prepared the food and updated the order status. After preparation, the order was handed over to the assigned delivery personnel. The block diagram emphasized menu management, order processing, and coordination with delivery agents.

- **Delivery Man Module:** This module illustrated the workflow of delivery personnel. Delivery agents logged in or registered on the platform, received assigned orders, and viewed order details. They proceeded to the designated restaurant to pick up the prepared meals and then delivered the order to the customer's location. During the process, the delivery man updated delivery status to support real-time tracking. The block diagram highlighted the sequence of pickup, delivery, and status updates to ensure timely and efficient service.

5.7 Distance Calculation Method

To determine the nearest restaurants and assign delivery personnel efficiently, the system calculates the geographical distance between two coordinates (latitude and longitude). The Haversine formula is used due to its accuracy over spherical surfaces such as Earth.

$$d = 2r \cdot \arcsin \left(\sqrt{\sin^2 \left(\frac{\Delta\phi}{2} \right) + \cos(\phi_1) \cos(\phi_2) \sin^2 \left(\frac{\Delta\lambda}{2} \right)} \right)$$

where:

- d = distance between two points
- r = Earth's radius (6371 km)
- ϕ_1, ϕ_2 = latitudes of the two points (in radians)
- λ_1, λ_2 = longitudes of the two points (in radians)
- $\Delta\phi = \phi_2 - \phi_1$
- $\Delta\lambda = \lambda_2 - \lambda_1$

This formula ensures accurate distance measurement used for restaurant listing, delivery assignment, and location-based filtering within the system.

5.8 Work Development Phase

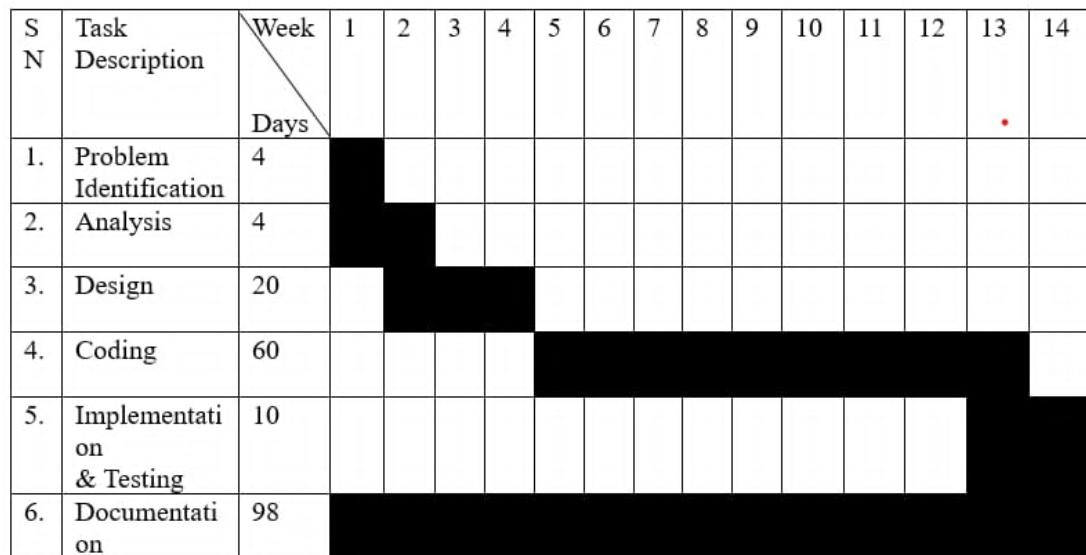


Figure 5.6: Work Development Phase of the System

Chapter 6

Result and Discussion

GrubMate is designed with a modular architecture in which the system functionalities are divided into distinct components. Each module addresses the specific roles, workflows, and responsibilities of its user group, ensuring clarity, scalability, and efficient system operation.

- **Admin Module:** Responsible for overall system supervision. The admin manages user accounts, oversees platform activities, monitors system performance, and ensures that the application operates smoothly and securely.
- **Client (Customer) Module:** Provides an intuitive, user-friendly interface for customers. This module allows users to browse restaurant menus, select food items, place orders, make secure payments, and track delivery status in real time. It supports a seamless food ordering experience.
- **Restaurant (Merchant) Module:** Designed for restaurant owners and staff to manage restaurant-related operations. Merchants can update restaurant profiles, add and modify menu items, process orders, monitor preparation status, and coordinate with delivery personnel for timely order handover.
- **Delivery Man Module:** Supports delivery personnel in performing delivery-related tasks. Delivery agents can log in, receive assigned orders, navigate optimized routes, update pickup and delivery statuses, and ensure real-time progress tracking for customers and restaurants.

This modular architecture promotes maintainability, reduces system complexity, and ensures smooth workflows tailored to the distinct needs of administrators, customers, restaurants, and delivery personnel.

6.1 Admin Module

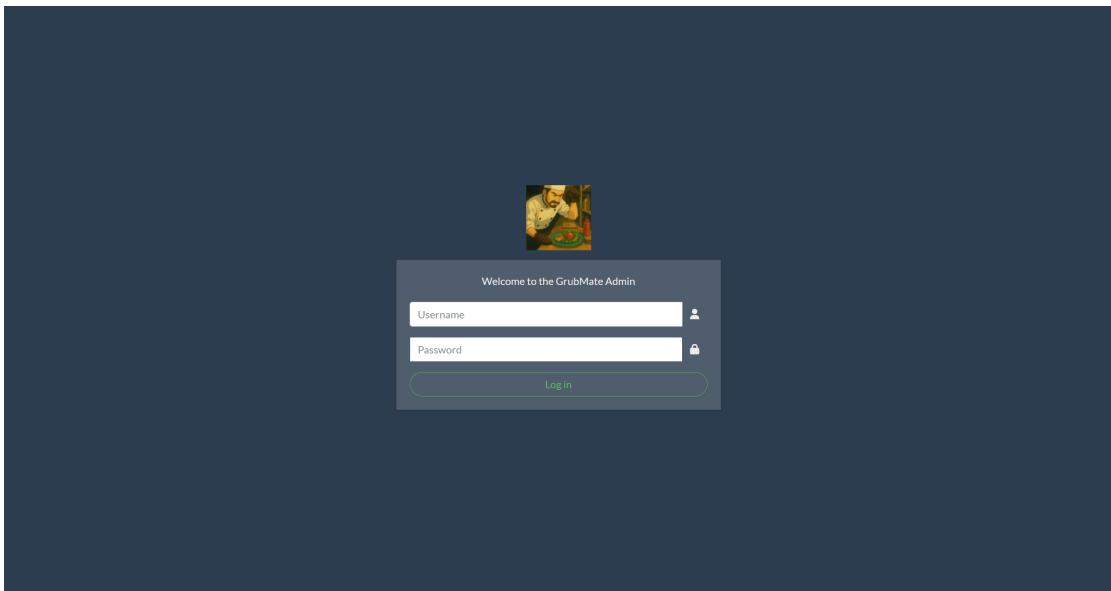


Figure 6.1: Admin Login Page

This login page is specifically for **Grubmate support admins (superusers)**. They enter their **admin username and password** to access the Django admin panel and manage the platform.

A screenshot of the GrubMate Admin home page. The left sidebar shows navigation links for Auth Token (Tokens), Authentication and Authorization (Groups, Users), Knox (Auth tokens), Merchant (Cuisines, Deliveries, Deliverymans, Food Order Counts, Food Items, Merchants, Orders, Restaurants), and a general section for Merchant (Cuisines, Deliveries, Deliverymans, Food Order Counts, Food Items, Merchants, Orders, Restaurants). The main dashboard area has two sections: "Auth Token" (Tokens, Add, Change) and "Knox" (Auth tokens, Add, Change). To the right is a "Recent actions" sidebar listing several recent activities with timestamps and user names.

Figure 6.2: Admin Home Page

This is the Django admin interface customized using the **Jazzmin theme**. It displays models such as **Users, Groups, Auth Tokens, Merchant Models, and App User Models**. Admins can manage data, approve applications, and oversee the entire system from this dashboard.

6.2 Client Module

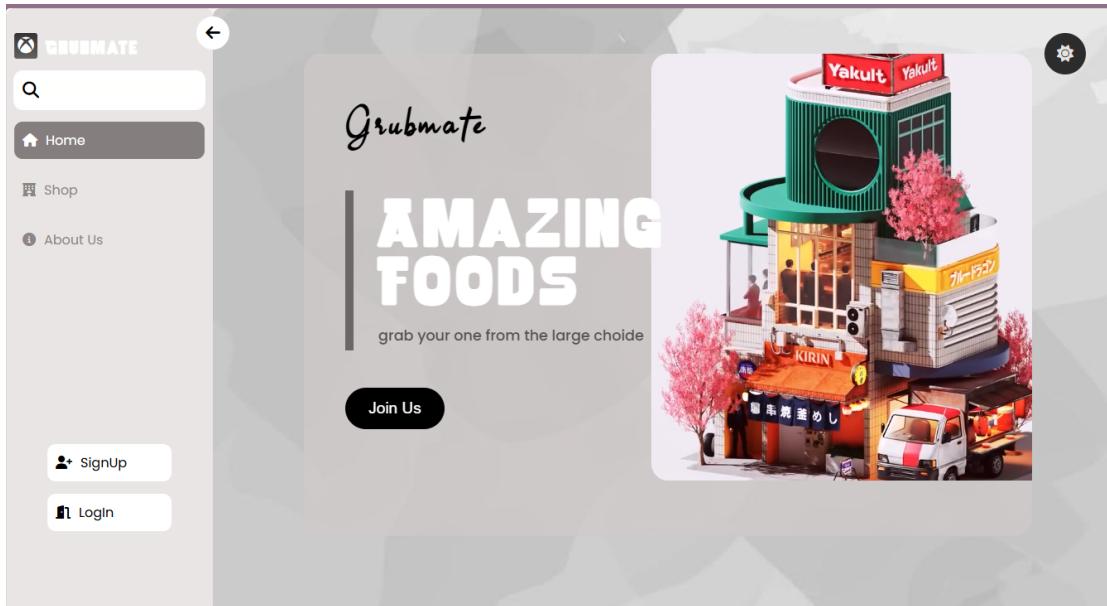


Figure 6.3: Client HomePage (Light Mode)

The GrubMate homepage features a clean sidebar navigation with intuitive access to core pages like Home, Shop, and About Us. Clients are prompted to Sign Up or Log In using clearly labeled buttons. The main content area welcomes clients with vibrant visuals and a strong call-to-action, encouraging engagement with the platform. The interface design prioritizes ease of use, branding consistency, and modern visual appeal.

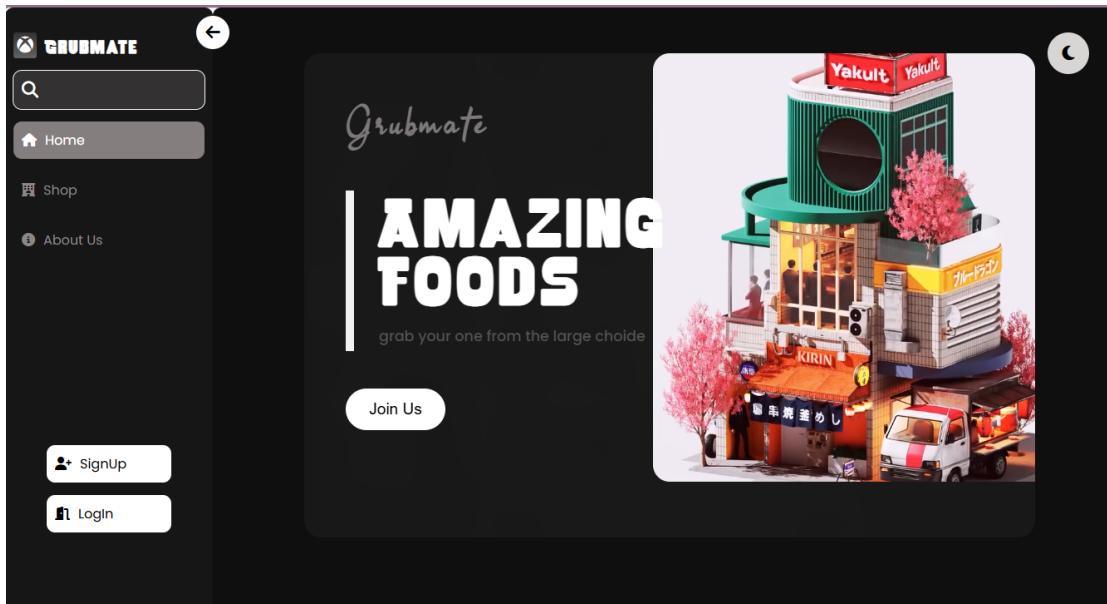


Figure 6.4: Client HomePage (Dark Mode)

The dark mode version of the GrubMate homepage enhances visual comfort, especially in low-light conditions, by adopting darker backgrounds and higher-contrast text. All

functional elements from the light mode—such as navigation, call-to-actions, and branding—are retained, ensuring usability and brand consistency while offering a visually refined experience for users preferring dark themes.

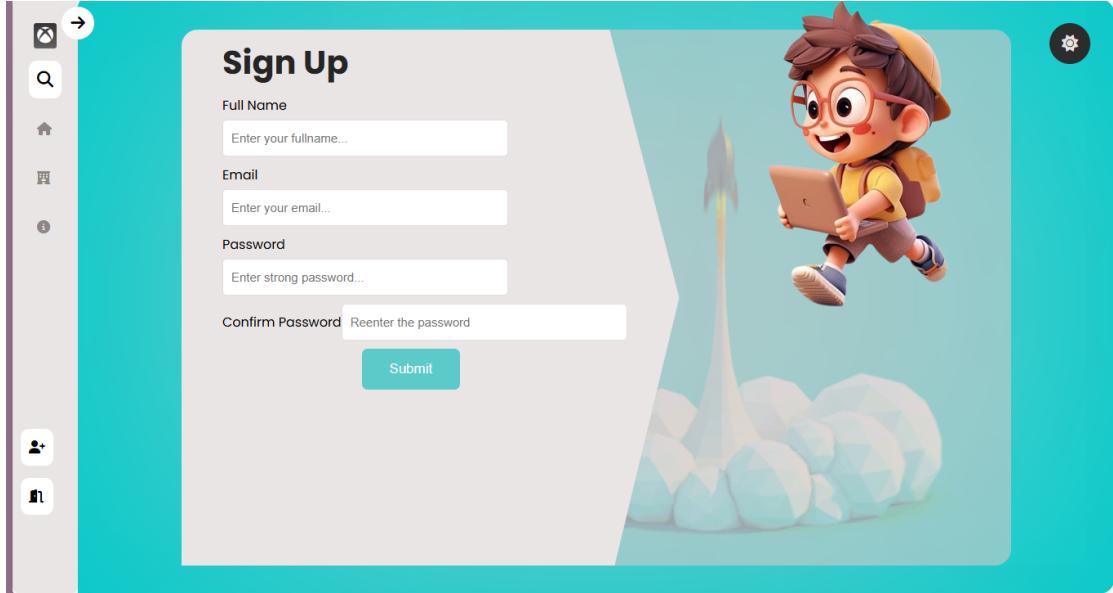


Figure 6.5: Sign Up Page

The sign-up interface features a **vibrant, welcoming theme**, using a light cyan background with a friendly 3D cartoon character illustration. The form includes fields for **Full Name**, **Email**, **Password**, and **Confirm Password**, with a clearly visible Submit button. The layout uses soft curves and spacious input fields for a user-friendly experience. The left navigation menu remains consistent with other pages, reinforcing usability and app structure.

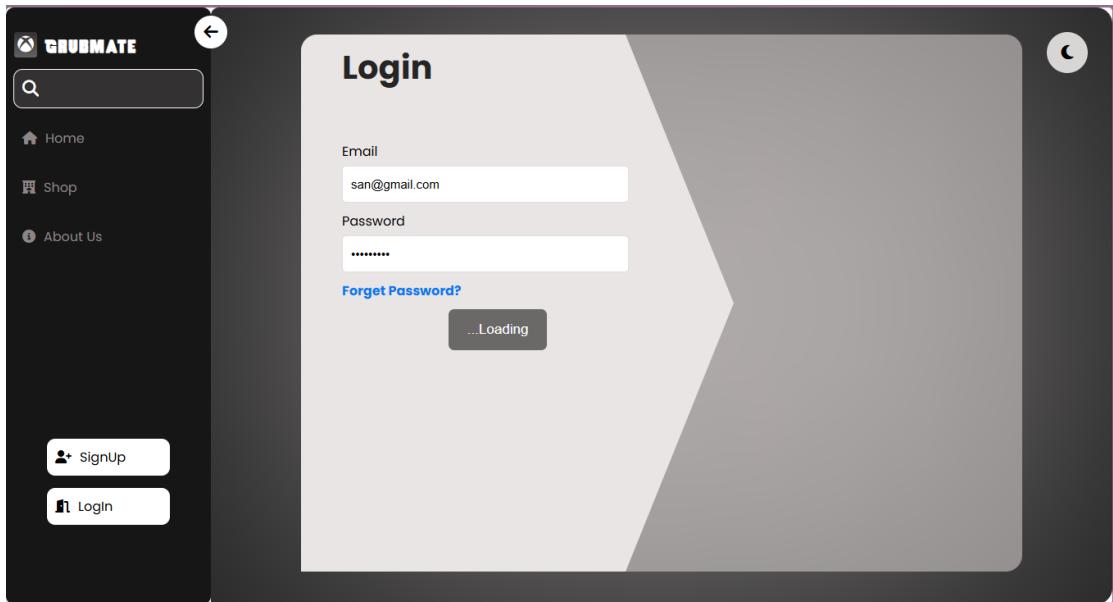


Figure 6.6: Login Page

The login page of GrubMate uses a **dark-themed layout** with a modern, minimal UI.

The left sidebar includes core navigation (Home, Shop, About Us), along with SignUp and LogIn buttons. On the right, the login form contains fields for email and password, along with a “Forget Password?” link and a **loading button** indicating an ongoing login process. The UI is visually intuitive, with sufficient contrast and padding for accessibility, and includes a dark-mode toggle at the top right.

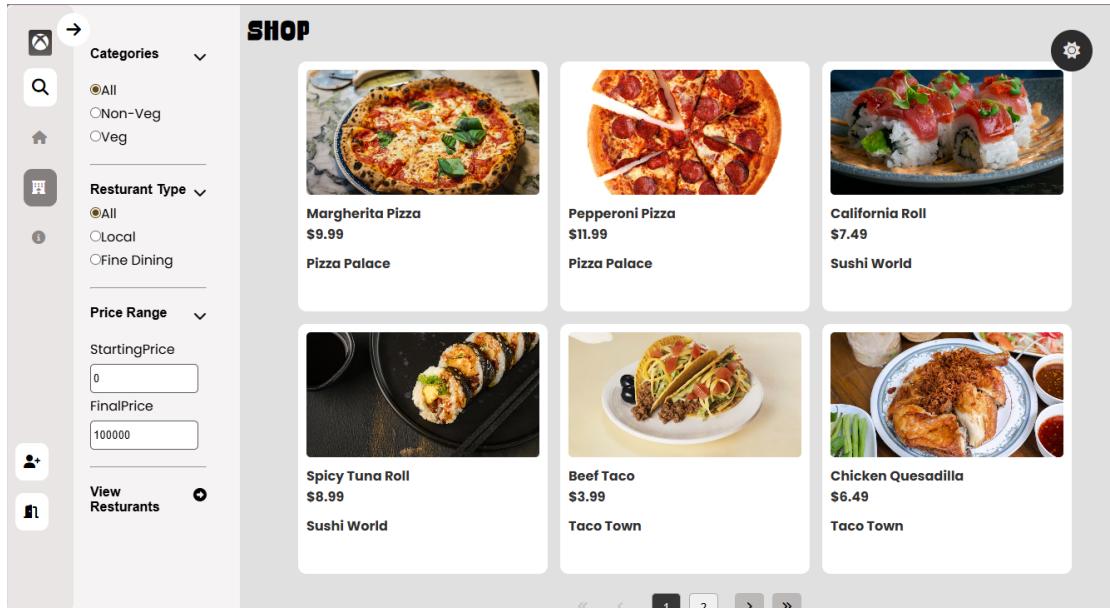


Figure 6.7: Shop Page

The Shop page enhances user experience by offering detailed filtering options such as food category (Veg/Non-Veg), restaurant type (Local/Fine Dining), and customizable price range. Each item is visually showcased with relevant details and a direct add-to-cart option, allowing users to efficiently find and order their desired meals.

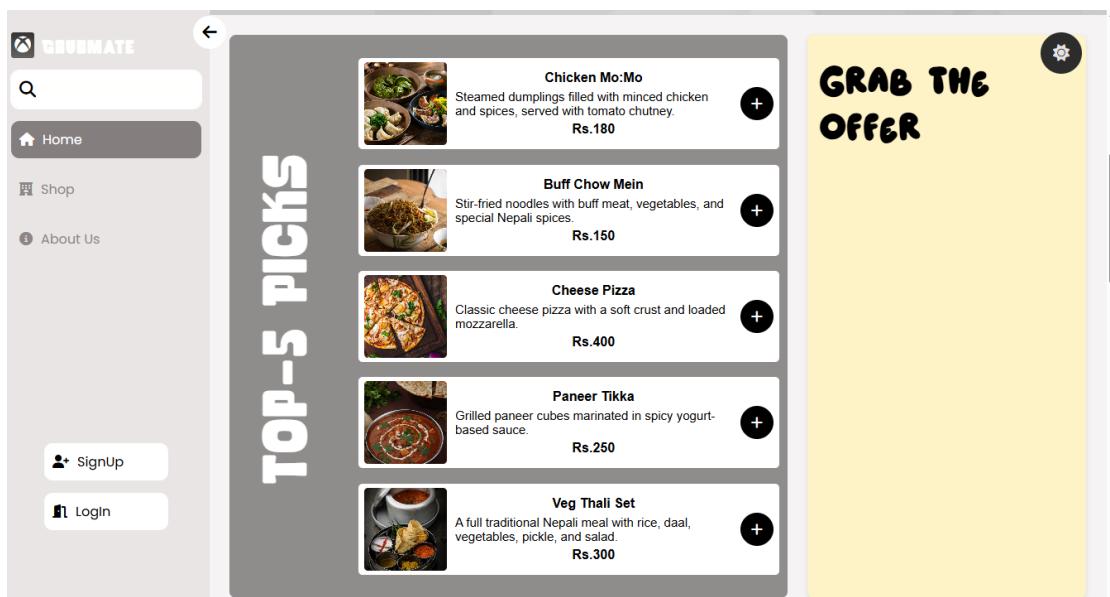


Figure 6.8: Most Ordered Items Page

The Most Ordered Foods section showcases the top 5 dishes with the highest order counts, calculated dynamically using the FoodOrderCount model. It helps guide clients toward popular menu items while increasing visibility and engagement for restaurants. Each item is visually highlighted with key details and direct call-to-action buttons for a seamless and smooth experience.

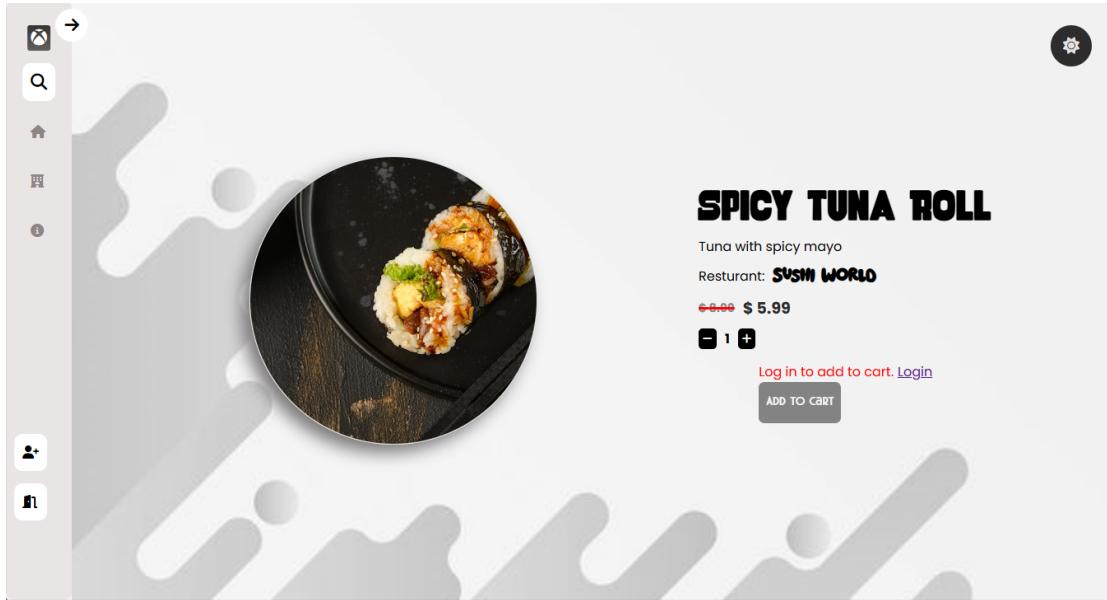


Figure 6.9: Item Page

The Item Page provides a detailed, user-friendly layout for each food item, featuring visuals, descriptions, pricing and cart interaction. It helps users make informed decisions and supports restaurant visibility by linking to the restaurant profile or menu.

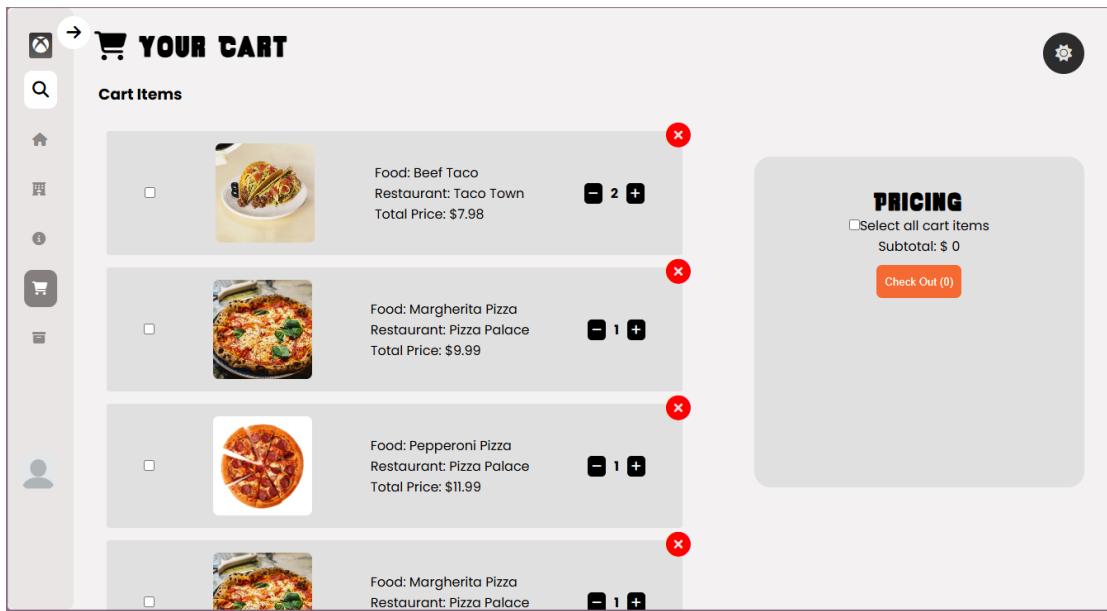


Figure 6.10: Cart View Page

The Cart View provides a structured, interactive overview of items selected by the

customer. It allows quantity adjustments, price review, and order finalization through a responsive and accessible layout. It plays a vital role in improving order accuracy and reducing checkout friction.

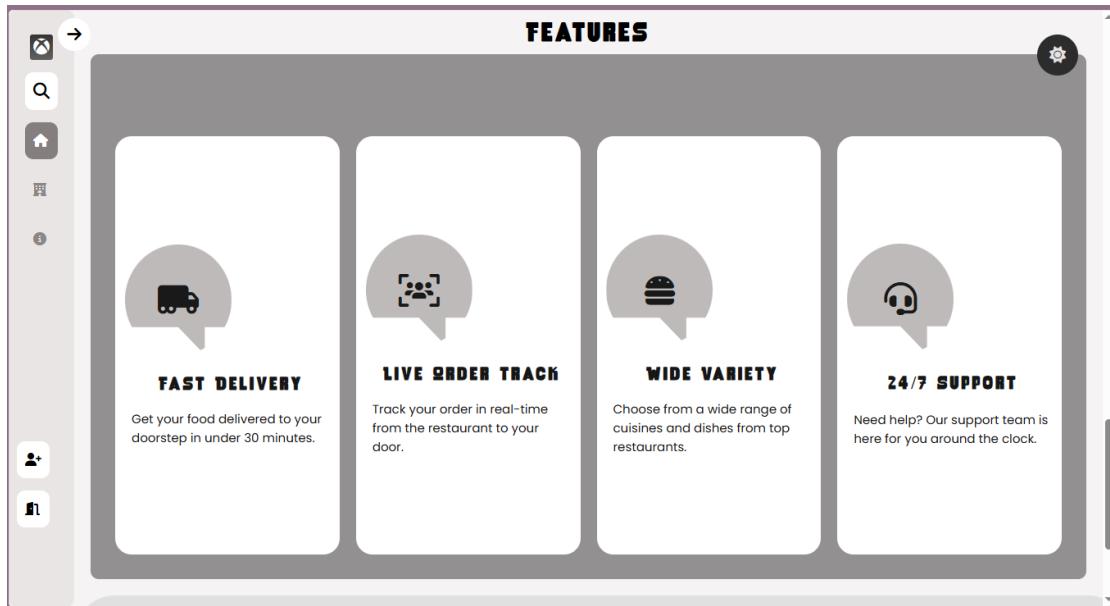


Figure 6.11: Features Page (Light Mode)

Features page in light mode visually presents GrubMate's key service offerings—Fast Delivery, Live Order Tracking, Wide Variety, and 24/7 Support—using an icon-based layout on a clean background. It helps users quickly understand the platform's strengths and fosters trust through a professional and accessible design.

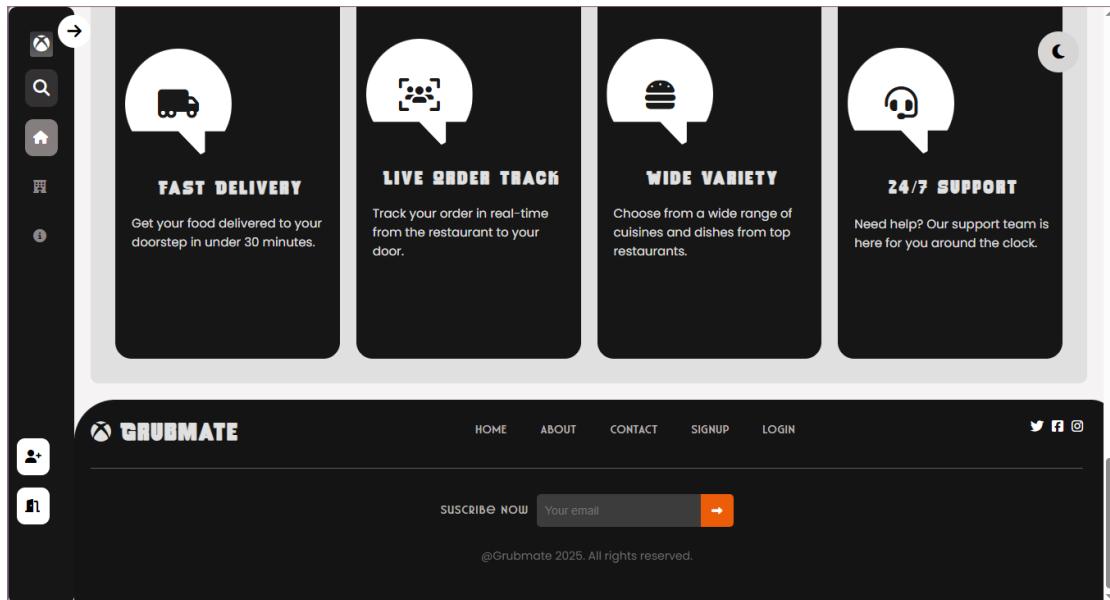


Figure 6.12: Features Page (Dark Mode)

In dark mode, the Features page transforms to a sleek, modern look where the background shifts to a deep dark blue or black, creating a comfortable viewing experience in low-light

environments. Icons representing GrubMate's key service offerings — Fast Delivery, Live Order Tracking, Wide Variety, and 24/7 Support — glow softly or display subtle, colored highlights to stand out against the dark background while maintaining visual harmony.

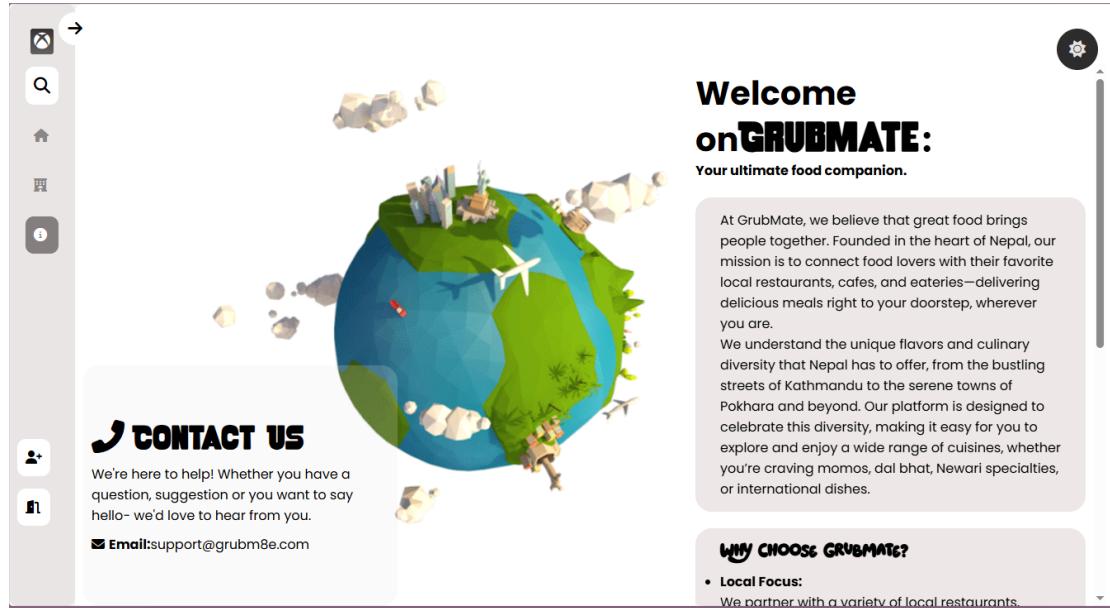


Figure 6.13: Contact Us Page (Light Mode)

This image depicts the "light mode" of the GrubMate website, featuring a bright and clean design. The page includes a "Welcome" section explaining the company's mission to celebrate Nepali cuisine and a "Contact Us" section with a support email. A prominent, stylized 3D globe graphic dominates the center, visually representing the platform's local and connected nature.

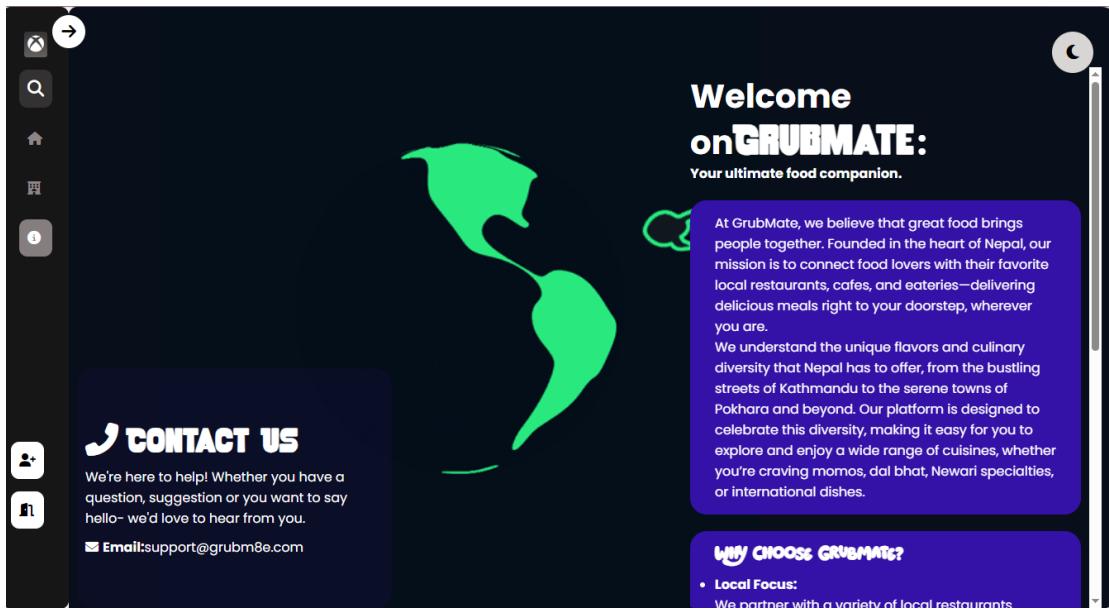


Figure 6.14: Contact Us Page (Dark Mode)

This image shows the "dark mode" version of the same GrubMate page, characterized by a sleek, high-contrast design. It features a dark background, white text, and a minimalist, abstract green graphic in place of the globe. The content—the company's mission and contact information—is identical to the light mode, demonstrating a flexible and user-friendly design that adapts to different aesthetic preferences.

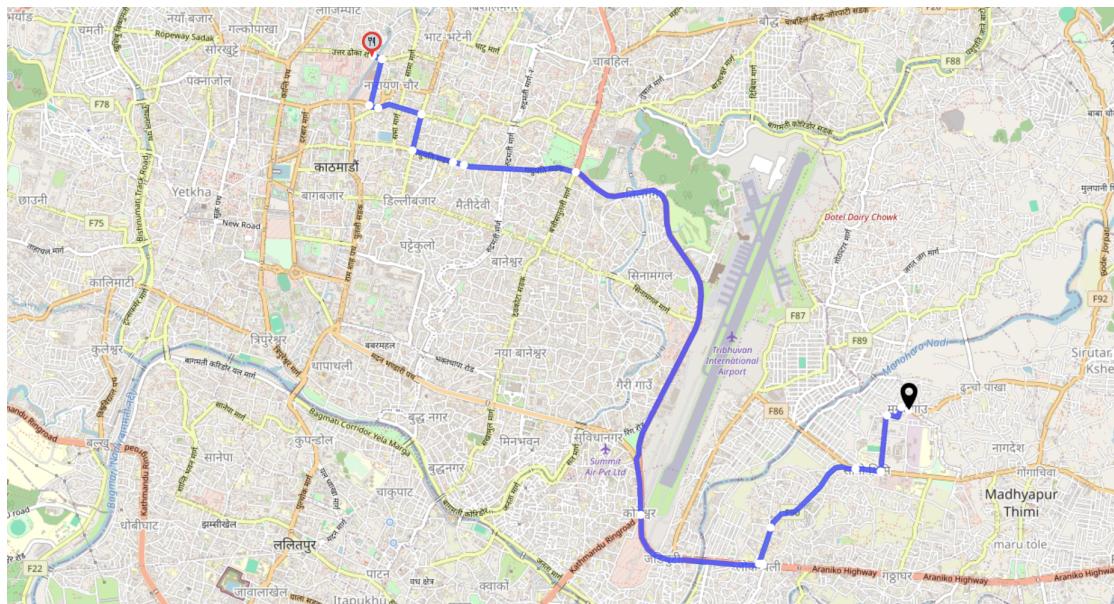


Figure 6.15: Map Overview

This interactive map displays your **real-time location** and provides **visual directions** from the **restaurant (order origin)** to your **current location**, using data from **OpenStreetMap contributors**. It offers a clear, user-friendly way to track your order's path in real time.

6.3 Merchant Module

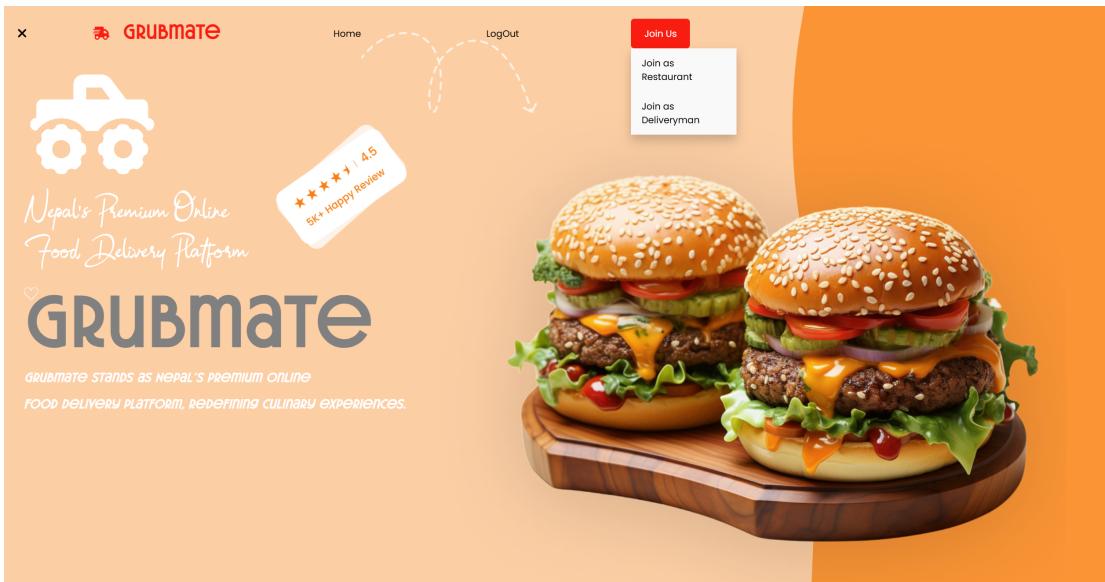


Figure 6.16: Merchant Homepage

This is the landing page for merchants—including restaurant owners and delivery personnel. It offers a warm introduction to the Grubmate Merchant App, with clear Sign Up / Login and Join Us options. Merchants can easily register or log in, and choose whether to join as a **Restaurant** or a **Deliveryman**.

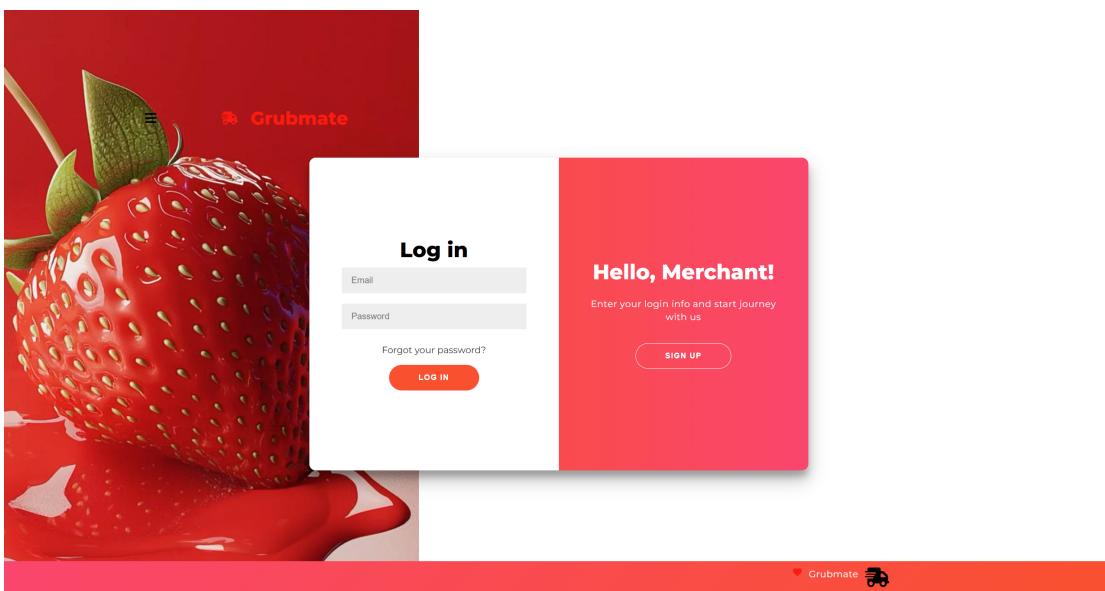


Figure 6.17: Merchant Login Page

This page allows merchants to securely log in using their **email** and **password**. If they've been logged out or are using a new device, they can regain access here. A "**Forgot Password?**" link is available for those who need to reset their password.

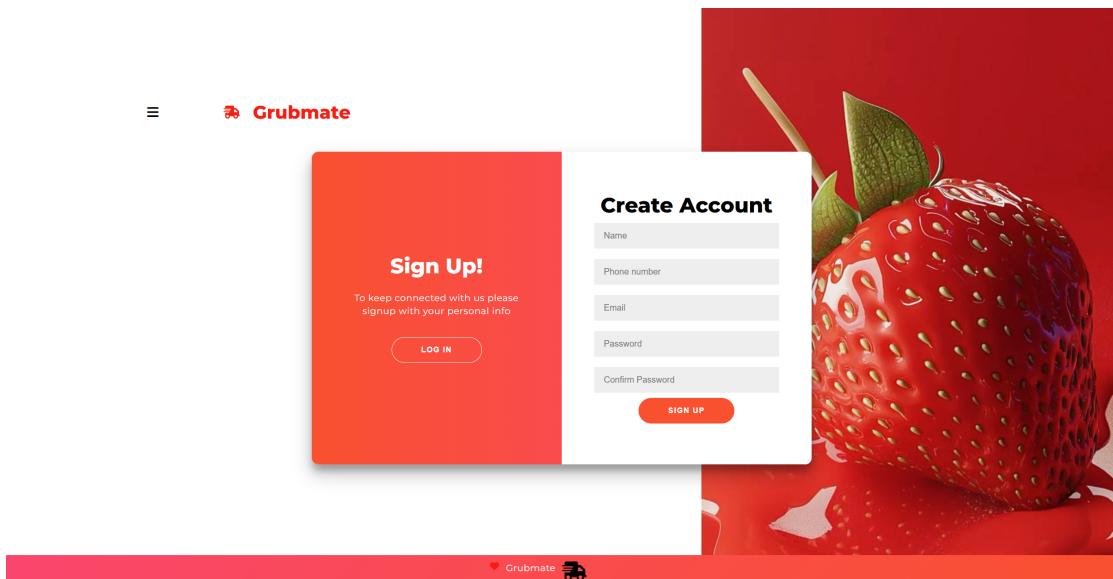


Figure 6.18: Merchant Sign In Page

MERCHANTS can create a new account via this page. To register, they must provide their **name, phone number, email, password, and password confirmation**. Upon successful sign-up, they are redirected to the home page where they can proceed to register as either a restaurant or a delivery partner.

A screenshot of the Restaurant Application Page. The page is divided into three main sections: General Information, Owner Information, and Additional Information. The General Information section includes fields for Restaurant Name, Company, Address, Location on Map (with a map showing a blue polygon), Cuisine Type, and Profile Picture. The Owner Information section includes fields for Full Name and Contact Number. The Additional Information section includes a field for Upload Menu (PNG, JPG, PDF) with a "Choose File" button. There are also "Next Step" and "Cancel" buttons at the bottom.

Figure 6.19: Restaurant Application Page

MERCHANTS who wish to register their **restaurant** use this page. They are required to fill out relevant details about their business, such as the name, address, cuisine type, and contact info, to complete the application.

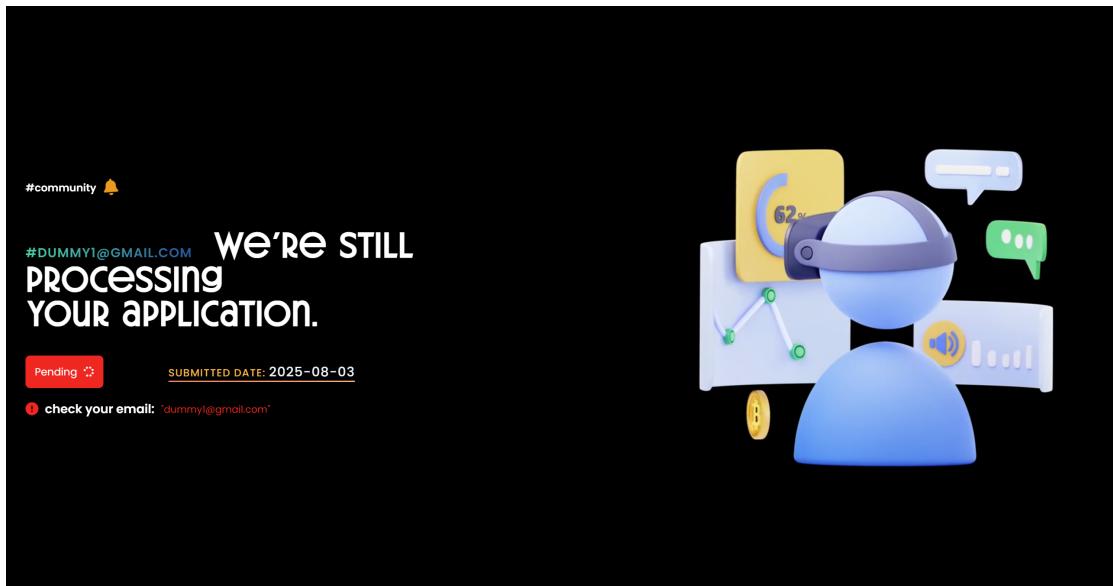


Figure 6.20: Restaurant Register Status: Pending

After submission, the merchant can view the status of their application. This page shows that the application is currently **pending**, meaning it is under review by the Grubmate support team.

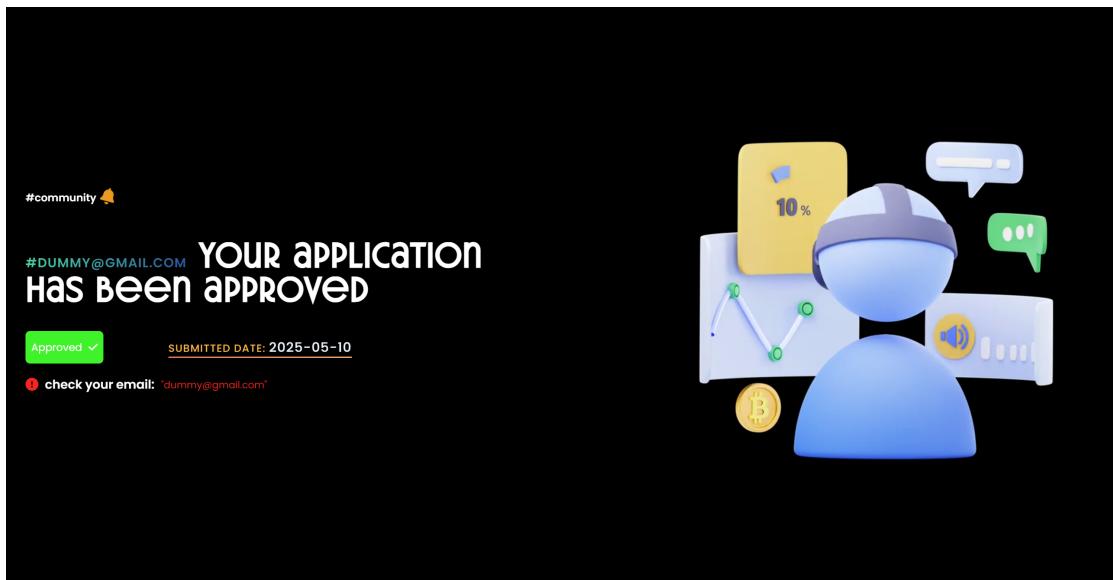


Figure 6.21: Restaurant Register Status: Approved

Once the Grubmate support admin verifies and approves the application, the status updates to **approved**. This confirms that the merchant (either restaurant or deliveryman) is now fully registered and active on the platform.



DEIVERYMAN APPLICATION

Deliveryman Info

First Name

Email

Zone

Identity Type

Identity Image

Last Name

Delivery Type

Vehicle

Identity Number

Additional Info

PAN Number

BillBook Scan Copy

Figure 6.22: Delivery Man Application Page

This page is dedicated to merchants who want to register as **delivery personnel**. It collects all necessary details (like personal and contact information) to submit a deliveryman application.

Forgot Password

Email Address

Enter the email address associated with your merchant account.

[Send Reset Link](#)

[Back to Login](#)

Figure 6.23: Forgot Password Page

If a merchant forgets their password, they can recover it using this page. By entering their registered **email address**, a password reset link will be sent to their inbox, allowing them to securely update their credentials.

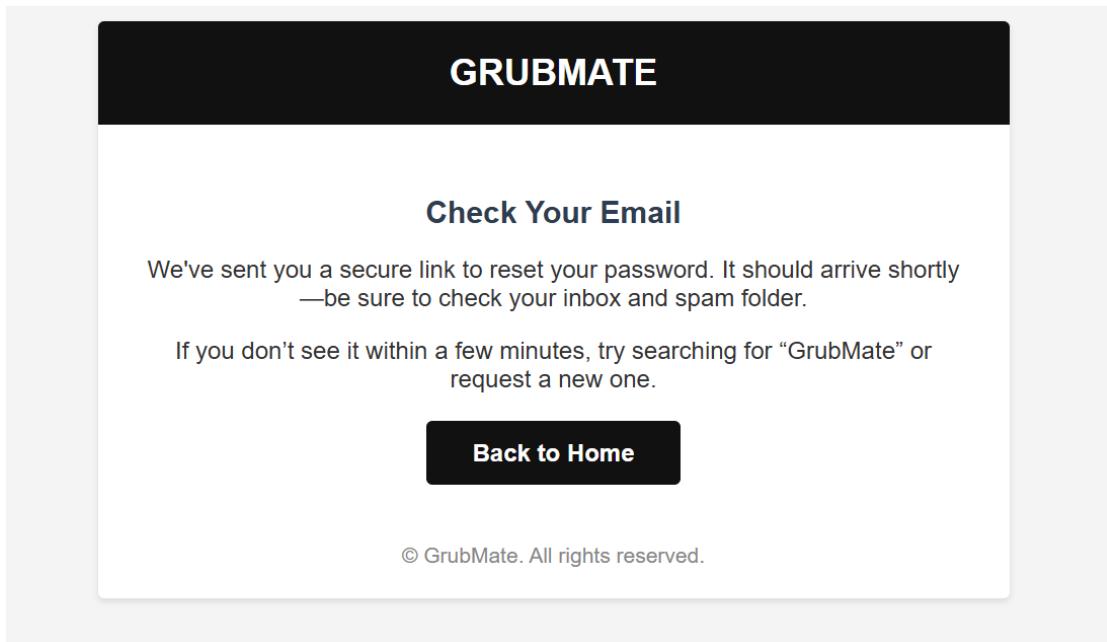


Figure 6.24: Forgot Password Email Form

After submitting the password reset request, this page confirms that a reset link has been successfully sent. It serves as a helpful reminder to check email inbox.

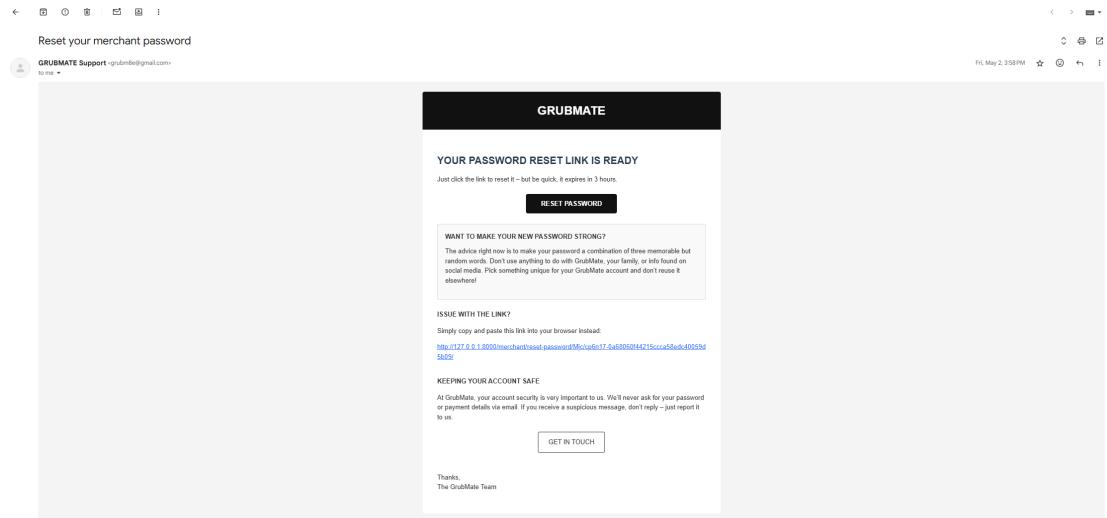


Figure 6.25: Forgot Password Email

This is the actual **email** sent by Grubmate's support system. It includes a secure **button** that redirects the merchant to the **Reset Password** page. This email ensures the identity of the requester before password changes are allowed.

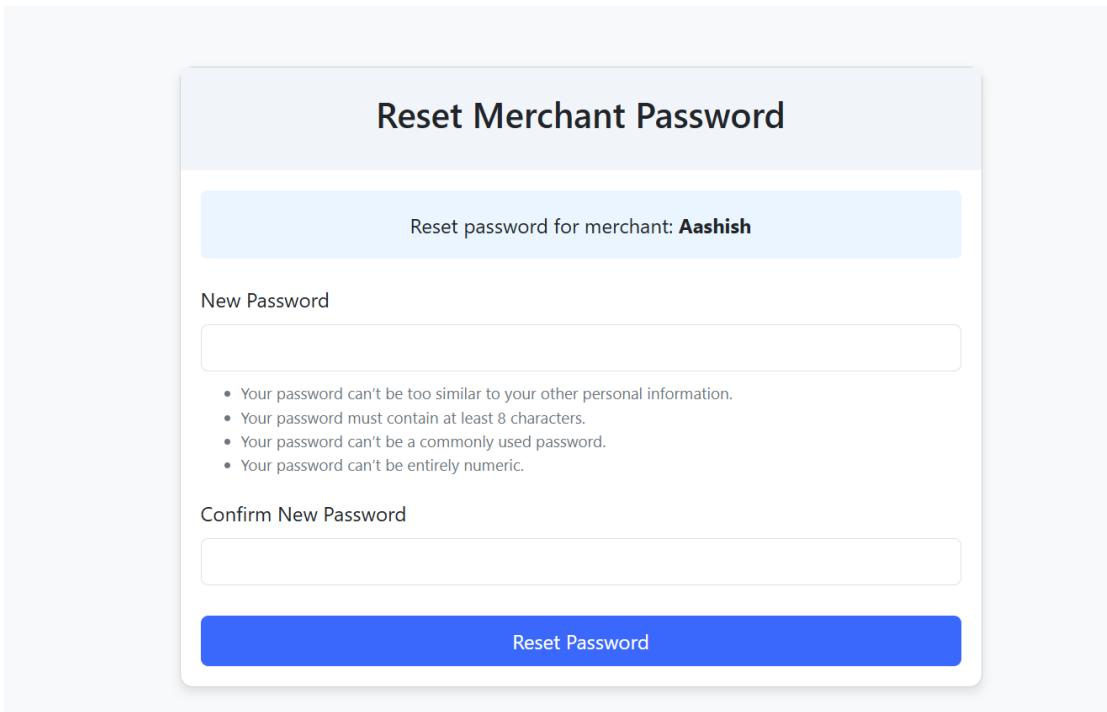


Figure 6.26: Password Reset Page

MERCHANTS ARE PROMPTED TO ENTER A **NEW PASSWORD** AND **CONFIRM** IT. PASSWORD GUIDELINES ARE DISPLAYED TO ENSURE SECURITY (E.G., MINIMUM CHARACTERS, SPECIAL SYMBOLS). AFTER SUCCESSFULLY UPDATING THEIR PASSWORD, THEY ARE REDIRECTED TO THE LOGIN PAGE TO ACCESS THEIR ACCOUNT.

6.4 API Overview

API Overview

API

[API overview](#)
[API token](#)
[API token refresh](#)

User Authentication

[Register App User](#)
[Login App User](#)
[Logout App User](#)
[Logout All Sessions](#)

Cart Management

[View Cart](#)
[Add to Cart](#)
[Delete Cart Item](#)
[Update Cart](#)
[Purchase Cart](#)

Orders

[Show User Orders](#)
[Place Order](#)

Products

[List Products](#)
[Get Product by ID](#)

Restaurants

Figure 6.27: API Overview Page

Using **Django REST Framework**, we've developed a suite of APIs to power the Grubmate food delivery frontend. These APIs manage essential functionalities, including user authentication with token management, cart and order operations, and the handling of product and restaurant data.

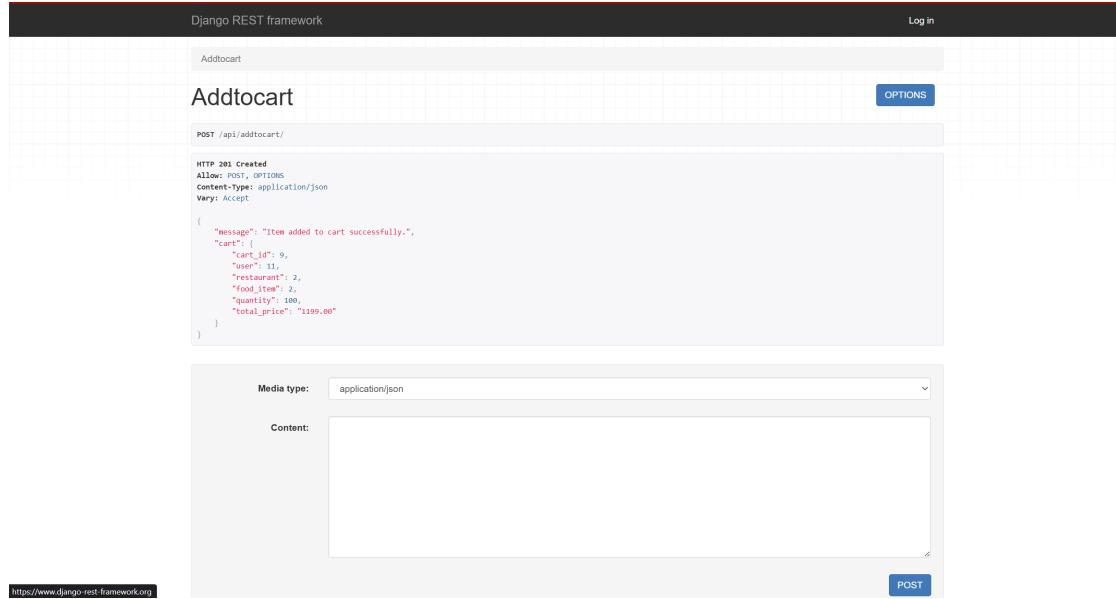


Figure 6.28: Add to Cart API Overview Example

This is a demo view of one of Grubmate's many APIs. In this example, a **POST** request is made with parameters like `restaurant_id`, `food_id`, and `quantity`. The response includes relevant cart details. This demo represents the structure of other Grubmate APIs, so only this one is displayed for demonstration purposes.

Chapter 7

Conclusion and Future Enhancements

In conclusion, GrubMate successfully delivers a comprehensive food ordering and delivery platform that integrates customers, restaurants, and delivery personnel in a seamless and efficient manner. The system's modular design, real-time tracking, and personalized features significantly enhance user experience and operational efficiency across all stakeholders.

For future enhancements, the following improvements could further elevate GrubMate's capabilities:

- Develop custom machine learning models for more accurate personalized food recommendations based on user preferences and ordering habits.
- Introduce more granular order tracking with real-time delivery route optimization and ETA predictions using AI algorithms.
- Expand object recognition features to include detailed identification of restaurant dishes, packaging, and delivery conditions using image processing.
- Integrate natural language processing (NLP) powered voice assistants to enable hands-free ordering and status updates, enhancing accessibility.
- Implement advanced loyalty and feedback analytics to dynamically tailor promotions and improve customer retention.

These future enhancements aim to leverage emerging technologies to refine user engagement, operational transparency, and overall service excellence, ensuring GrubMate remains competitive and user-centric in the evolving food delivery landscape.

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