

# Ahar24: A Modern Restaurant Food Delivery Management System

by

Syed Bayes Iqbal  
22273014

A project submitted to the Department of Computer Science and Engineering  
in partial fulfillment of the requirements for the degree of  
M.Engg. in Computer Science and Engineering

Department of Computer Science and Engineering  
Brac University  
November 2024

© 2024. Syed Bayes Iqbal  
All rights reserved.

# Declaration

It is hereby declared that

1. The project submitted is my own original work while completing degree at Brac University.
2. The project does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.
3. The project does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution.
4. I have acknowledged all main sources of help.

**Student's Full Name & Signature:**

---

Syed Bayes Iqbal  
22273014

# Approval

The project titled “Ahar24: A Modern Restaurant Food Delivery Management System” submitted by

1. Syed Bayes Iqbal (22273014)

Of Summer, 2024 has been accepted as satisfactory in partial fulfillment of the requirement for the degree of M.Engg. in Computer Science and Engineering on 14th November, 2024.

## Examining Committee:

Supervisor:  
(Member)



---

Moin Mostakim  
Senior Lecturer  
Department of Computer Science and Engineering  
Brac University

Program Coordinator:  
(Member)

---

Md Sadek Ferdous, PhD  
Professor  
Department of Computer Science and Engineering  
Brac University

Head of Department:  
(Chair)

---

Sadia Hamid Kazi, PhD  
Chairperson and Associate Professor  
Department of Computer Science and Engineering  
Brac University

## **Acknowledgement**

Firstly, all praise to Allah for whom my project has been completed without any major interruption. Secondly, to my Supervisor Md. Moin Mostakim sir for his kind support and advice in my work. He helped me whenever I needed help. And finally, to my parents, without their through support it may not have been possible. With their kind support and prayer I am now on the verge of my graduation.

# Abstract

The rapid digital transformation has significantly impacted the food and restaurant industry, leading to the emergence of online food delivery systems. This research presents the development of Ahar24: A Modern Restaurant Food Delivery Management System, a comprehensive platform designed to streamline food delivery operations and enhance user experience. The system integrates advanced features such as personalized food recommendations powered by AI, a smart menu search with natural language understanding, dynamic pricing and discounts, and real-time order prediction and optimization. These features cater to both customers and administrators, ensuring seamless interactions, efficient order management, and data-driven decision-making.

For customers, the platform offers a user-friendly interface for browsing menus, placing orders, and accessing tailored food suggestions based on preferences and past behavior. Administrators benefit from robust management tools, including insights into customer behavior, trending items, and demand forecasting. The system is implemented using cutting-edge technologies such as React.js, Node.js, and MongoDB, ensuring scalability and efficiency. While still under development and testing, Ahar24 demonstrates the potential to redefine modern restaurant operations and food delivery services by incorporating innovation, user-centric design, and advanced analytics.

**Keywords:** Food delivery management system, AI-powered recommendations, smart menu search, dynamic pricing, order optimization.

# Table of Contents

Declaration	i
Approval	ii
Acknowledgment	iii
Abstract	iv
Table of Contents	iv
List of Figures	vii
List of Tables	viii
<b>1 Introduction</b>	<b>1</b>
<b>2 Software Engineering Lifecycle Business goals</b>	<b>2</b>
2.1 SDLC Life Cycle . . . . .	2
2.1.1 Waterfall Model: . . . . .	2
2.1.2 Requirement Analysis: . . . . .	2
2.1.3 System Design and Coding: . . . . .	2
2.1.4 Implementation: . . . . .	3
2.1.5 Integration and Testing: . . . . .	3
2.1.6 Deployment of the System: . . . . .	4
2.1.7 Maintenance: . . . . .	4
2.2 System Request . . . . .	5
<b>3 Project Description</b>	<b>6</b>
3.1 Benefits and Drawbacks . . . . .	6
3.1.1 Benefits . . . . .	6
3.1.2 Drawbacks . . . . .	6
3.2 Hardware and Software Requirements . . . . .	7
3.2.1 Hardware Requirements . . . . .	7
3.2.2 Software Requirements . . . . .	7
3.3 Project Analysis . . . . .	7
3.4 Feasibility Report . . . . .	8
3.4.1 Economic . . . . .	8
3.4.2 Technical . . . . .	8
3.5 Modules . . . . .	8

<b>4</b>	<b>Model Description</b>	<b>9</b>
4.1	Use Case Diagram . . . . .	9
4.2	Class Diagram . . . . .	11
4.3	Data Flow Diagram . . . . .	14
4.4	ERD Diagram . . . . .	15
<b>5</b>	<b>Features and Functionalities</b>	<b>17</b>
5.1	Customer Side Features . . . . .	17
5.2	Admin Dashboard Features . . . . .	17
5.3	Order Management . . . . .	18
5.4	Inventory Management . . . . .	18
5.5	User Authentication and Authorization . . . . .	19
<b>6</b>	<b>User Interface Design</b>	<b>20</b>
6.1	Admin Interface . . . . .	20
6.2	Responsive Design Considerations . . . . .	21
<b>7</b>	<b>Implementation</b>	<b>23</b>
7.1	Frontend Development . . . . .	23
7.2	Backend Development . . . . .	24
7.3	Database Implementation . . . . .	24
7.4	API Integration . . . . .	25
7.5	Testing and Debugging . . . . .	25
<b>8</b>	<b>Results</b>	<b>26</b>
8.1	Customer Interaction and Order Placement . . . . .	26
8.2	Admin Dashboard Insights . . . . .	27
8.3	Performance and Load Testing . . . . .	28
<b>9</b>	<b>Discussion</b>	<b>29</b>
9.1	Challenges Faced During Development . . . . .	29
9.2	Solution Approaches . . . . .	30
<b>10</b>	<b>Conclusion</b>	<b>32</b>
10.0.1	Summary of Work Done . . . . .	32
10.0.2	Contributions of the Project . . . . .	33
10.0.3	Future Scope . . . . .	33
<b>11</b>	<b>Appendix</b>	<b>35</b>
	<b>Bibliography</b>	<b>35</b>

# List of Figures

4.1	Use Case Diagram . . . . .	9
4.2	Class Diagram . . . . .	11
4.3	Data Flow Diagram . . . . .	14
4.4	Entity Relationship Diagram (ERD) . . . . .	15
11.1	Login . . . . .	35
11.2	Sign Up . . . . .	36
11.3	Header & Landing Page . . . . .	36
11.4	Menu Categories . . . . .	37
11.5	Menu Page . . . . .	37
11.6	Menu Sorted by Category . . . . .	38
11.7	Cart Page . . . . .	38
11.8	Order Page . . . . .	39
11.9	Checkout Page . . . . .	39
11.10	Chatbot . . . . .	40
11.11	Customer Statistics . . . . .	41
11.12	Adding Menu From Admin Panel . . . . .	41
11.13	Data Page Admin Panel . . . . .	42
11.14	Menu List Admin Panel . . . . .	42
11.15	Order Page Admin Panel . . . . .	43
11.16	Food Status List Admin Panel . . . . .	43
11.17	Privacy Policy . . . . .	44
11.18	About Us . . . . .	45
11.19	Contact Us . . . . .	45



# List of Tables

2.1 System Request . . . . .	5
------------------------------	---

# Chapter 1

## Introduction

The growing reliance on digital services has transformed various industries, with the food delivery sector seeing remarkable growth. Ahar24 is a full-stack food delivery platform that addresses the rising demand for efficient and personalized meal ordering. Developed using modern technologies like React.js for the frontend, Node.js and Express for the backend, and MongoDB for scalable data storage, Ahar24 delivers a seamless experience tailored to both customers and restaurant administrators.

The platform includes advanced features such as AI-powered personalized food recommendations based on customers' past orders, dietary preferences, and seasonal trends. Smart menu search with natural language understanding allows users to make queries like "Show me spicy vegetarian dishes under 10 taka," while dynamic filters enable selection based on cuisine, ingredients, or calorie count. Additionally, Ahar24 supports dynamic pricing, offering discounts on less popular items and personalized promotions to encourage customer loyalty.

For customers, secure user authentication allows account creation, login, and profile management with ease. A robust shopping cart functionality enables users to add food items, review their orders, and place them effortlessly. Real-time notifications provide estimated delivery times and encourage pre-orders during peak hours. Customers can also interact with an integrated chatbot for convenient order placement via a conversational interface. To improve transparency and control, the platform provides statistical insights on daily spending and order history.

For administrators, Ahar24 offers a powerful dashboard featuring data visualizations like top-ordered items, customer spending trends, and overall sales performance. AI-driven analytics provide insights into customer behavior, trending items, and demand forecasting, empowering restaurant managers to make informed decisions. Dynamic pricing recommendations and AI-powered upselling features, such as suggesting complementary items, further enhance operational efficiency and profitability.

Ahar24 currently operates on a Cash on Delivery (COD) model to simplify transactions and build customer trust. The project is in its development and testing phase, continuously integrating innovative features to redefine modern restaurant food delivery systems. By merging cutting-edge technology with user-centric design, Ahar24 sets a new standard for managing food delivery services in today's fast-paced digital era.

# Chapter 2

## Software Engineering Lifecycle Business goals

### 2.1 SDLC Life Cycle

#### 2.1.1 Waterfall Model:

The development of the Ahar24 system followed the Waterfall model of SDLC (Software Development Life Cycle). The Waterfall model is a linear sequential approach to software development, where each phase must be completed before the next begins. This ensured a structured development process where the project moved through each phase systematically, allowing clear documentation and comprehensive testing at each stage.

#### 2.1.2 Requirement Analysis:

During the requirement analysis phase, all necessary requirements for the Ahar24 food delivery platform were gathered. This involved identifying the need for:

- An intuitive user interface for customers and admins.
- Secure customer authentication and profile management.
- Smooth order placement, real-time notifications, and chatbot interaction.
- Advanced features like personalized food recommendations, smart menu search, dynamic pricing, and customer analytics.
- A robust admin panel for monitoring order trends, inventory, and customer insights.

Input from stakeholders, including restaurant managers and potential users, was collected to ensure that the platform met both customer and business needs.

#### 2.1.3 System Design and Coding:

In this phase, the system's architecture was designed, encompassing both frontend and backend components.

- The **frontend**, built using React.js, ensures a responsive and user-friendly interface with features like chatbot integration, smart menu filters, and statistical graphs for customers.
- The **backend**, developed with Node.js and Express, handles core functionalities such as order management, AI-based recommendations, and admin analytics.
- Data storage and retrieval are managed through **MongoDB Atlas**, providing a scalable NoSQL database.

Each module, including user authentication, menu management, and dynamic pricing algorithms, was developed independently and later integrated.

#### 2.1.4 Implementation:

Based on the design, the implementation phase introduced key features:

- **Customer Features:**
  - Personalized food recommendations based on past orders and dietary preferences.
  - Smart menu search with natural language queries.
  - Dynamic discounts and real-time notifications for delivery updates.
  - Integration of a chatbot for seamless conversational ordering.
- **Admin Features:**
  - Dashboard with visual analytics, including order trends and customer behavior.
  - AI-driven insights for upselling and demand forecasting.
  - Inventory management and performance tracking.

Each feature was tested for accuracy and functionality during this phase.

#### 2.1.5 Integration and Testing:

After individual modules were implemented, they were integrated into a unified system. Rigorous testing was performed, including:

- **Functional Testing:** Ensuring features like search, recommendations, and order processing worked as intended.
- **Compatibility Testing:** Verifying system performance across various devices and browsers.
- **Load Testing:** Simulating high traffic to test system stability under stress.

### **2.1.6 Deployment of the System:**

Once testing was completed, the system was deployed in a controlled environment. Currently, Ahar24 operates on a Cash on Delivery (COD) model, providing a simplified payment process. The deployed version allows customers to place orders and admins to monitor operations through the dashboard.

### **2.1.7 Maintenance:**

Post-deployment, the system entered the maintenance phase, where updates and patches were applied based on user feedback. Planned updates include expanded AI capabilities, such as advanced recommendation algorithms, and the integration of loyalty programs to enhance user retention. Maintenance efforts ensure that the system evolves with user needs and market trends.

## 2.2 System Request

Table 2.1: System Request

<b>Project name</b>	<b>Ahar24: A Modern Restaurant Food Delivery Management System</b>
<b>Project business need</b>	The primary motivation of this project is to deploy a modern food delivery management system to streamline restaurant orders and deliveries while incorporating AI-driven innovations.
<b>Business Requirement</b>	<ul style="list-style-type: none"><li>• Enable users to browse, select, and order food online.</li><li>• Provide personalized recommendations and dynamic discounts for customers.</li><li>• Ensure secure user authentication using a custom JWT-based system.</li><li>• Allow admin users to manage orders, track deliveries, and optimize pricing using analytics.</li></ul>
<b>Business values</b>	<ul style="list-style-type: none"><li>• Centralized system to manage restaurant data and orders efficiently.</li><li>• Enhanced user experience through personalization and intuitive design.</li><li>• AI-driven insights for admins to optimize menu offerings and pricing.</li><li>• Streamlined operations, improving accuracy and customer satisfaction.</li></ul>
<b>Constraints</b>	Limited development time and resources to implement all planned AI features at launch.

# Chapter 3

## Project Description

### 3.1 Benefits and Drawbacks

The **Ahar24: A Modern Restaurant Food Delivery Management System** offers several benefits and drawbacks, which are outlined below:

#### 3.1.1 Benefits

- **Real-time Data Tracking:** Admins can monitor sales, customer orders, and behavior analytics through an enhanced Data section, enabling data-driven decision-making and trend analysis over time.
- **Efficient Order Management:** Features like dynamic pricing, demand forecasting, and AI-driven preparation optimization streamline the management of orders and inventory, reducing delays and improving customer satisfaction.
- **Personalized User Experience:** Customers benefit from AI-powered food recommendations tailored to their dietary preferences, past orders, and seasonal trends, making the ordering process engaging and intuitive.
- **Advanced Admin Insights:** The system provides visual analytics such as top-ordered items, customer spending patterns, and ROI analysis for promotions, enabling administrators to refine their strategies effectively.
- **Automation of Repetitive Tasks:** Chatbot integration for ordering, automatic tagging of menu items, and dynamic notifications reduce manual effort, ensuring smoother operations.

#### 3.1.2 Drawbacks

- **Payment Limitations:** The system currently supports only Cash on Delivery (COD). There is no integration for online payments such as credit cards or digital wallets, which limits flexibility for users.
- **Scalability Concerns:** As the project is built on a monolithic architecture, scaling to handle significantly larger user bases may require transitioning to a microservices framework.

- **Security Challenges:** Although security measures like JWT-based authentication are implemented, additional frameworks for handling sensitive data will be required if online payments are introduced in the future.
- **Advanced Functionalities Pending:** Features like refunds, integration with third-party logistics, and loyalty programs are planned but not yet implemented, leaving room for further development.

## 3.2 Hardware and Software Requirements

### 3.2.1 Hardware Requirements

The following hardware specifications are recommended for running the Ahar24 platform:

- **Processor:** Intel Core i5 or higher
- **RAM:** 8GB or higher (4GB may suffice for smaller operations)
- **PC:** One system for admin management
- **Operating System:** Windows 10, Ubuntu 20.04, or MacOS

### 3.2.2 Software Requirements

- **Frontend:** React.js
- **Backend:** Node.js, Express.js
- **Database:** MongoDB (Atlas)
- **Authentication:** JWT (JSON Web Tokens)
- **Version Control:** Git and GitHub
- **Payment Integration:** Currently supports only Cash on Delivery (COD)
- **Chart Visualization:** Libraries such as Chart.js and Recharts for admin data visualizations
- **IDE/Text Editor:** Visual Studio Code or any IDE that supports JavaScript development

## 3.3 Project Analysis

The Ahar24 platform is designed to provide a robust and scalable solution for managing food delivery services. With features such as AI-driven recommendations, dynamic pricing, and demand prediction, the system improves operational efficiency for restaurants while enhancing customer satisfaction. The platform enables restaurant managers to track trends, optimize their offerings, and streamline the ordering process, making it an invaluable tool in the competitive food delivery market.



## 3.4 Feasibility Report

### 3.4.1 Economic

- Reduces the need for extensive manual management by automating repetitive tasks such as order updates and menu tagging.
- Optimizes operational costs by leveraging AI for dynamic pricing and inventory control.
- Minimizes infrastructure costs by supporting Cash on Delivery, avoiding dependency on third-party payment gateways.

### 3.4.2 Technical

- The use of React.js ensures a responsive, modern interface that works seamlessly across devices.
- The system incorporates cutting-edge AI technologies for personalized recommendations and data analytics, enhancing the user experience and admin capabilities.
- The chatbot interface offers a convenient, innovative solution for customers to place orders directly from the homepage.

## 3.5 Modules

The following modules form the backbone of the Ahar24 system:

- **Admin Panel:** Provides tools for managing menu items, monitoring sales, analyzing customer data, and updating order statuses.
- **User Authentication:** Offers secure registration, login, and account management, ensuring all user data and orders are linked to individual profiles.
- **Order Management:** Enables customers to place and track food orders, while allowing admins to update statuses and assign deliveries.
- **Cart Management:** Customers can add, remove, and review items in their cart, with a simplified checkout process supporting Cash on Delivery.
- **Data Analytics Page:** Displays insights like top-ordered items, customer trends, and daily sales in visual formats for easy analysis by admins.
- **Chatbot Ordering:** An integrated chatbot allows customers to place orders conversationally, making the process intuitive and engaging.
- **AI Features:** Powers personalized recommendations, smart menu searches, dynamic pricing strategies, and demand predictions.

# Chapter 4

## Model Description

### 4.1 Use Case Diagram

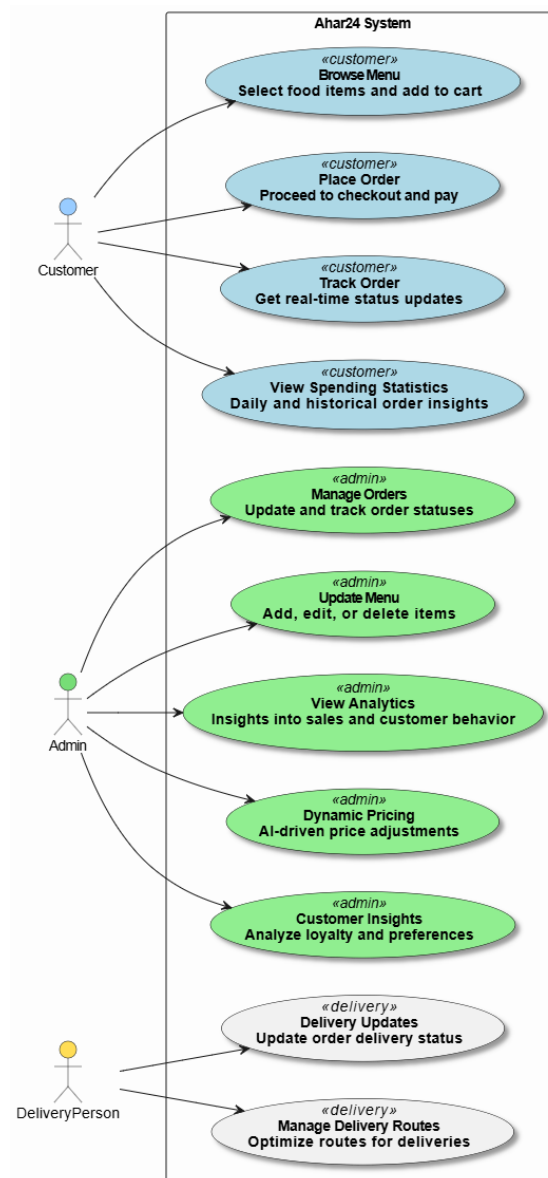


Figure 4.1: Use Case Diagram

The use case diagram illustrates the interactions between the primary actors in the Ahar24 system: the Customer, the Admin, and the Delivery Person. It showcases the various functionalities that each actor can perform within the system, with a focus on newly added features like AI-powered recommendations, dynamic pricing, and real-time order tracking.

**Customer:**

- *Browse Menu:* The customer can view the available food items on the menu.
- *Place Order:* The customer can place an order for the desired food items, adding them to their cart and proceeding to secure payment.
- *View Order History:* The customer can view their past orders, including order status, payment details, and delivery updates.
- *View Statistics:* Customers can see personalized statistics, such as spending history, order frequency, and AI-driven recommendations (e.g., "You might like...").
- *Track Order:* The customer can track the status of their current orders in real-time, receiving notifications on the order's progress.
- *Receive Personalized Recommendations:* AI-powered suggestions based on past orders, preferences, and current trends help customers discover new menu items.
- *Smart Search and Filters:* Customers can search for dishes using natural language queries (e.g., "Show me spicy vegetarian dishes") and filter by price, dietary preferences, or calories.

**Admin:**

- *Manage Menu:* The admin can add, update, or remove items from the menu, including setting prices, availability, and categorizing food items.
- *View Orders:* The admin can view all incoming orders placed by customers, monitor order statuses, and identify pending or completed orders.
- *Update Order Status:* The admin can update the status of any order, such as marking it as prepared, dispatched, or delivered.
- *View Statistics:* The admin can access detailed statistics regarding sales, customer behavior, popular items, and dynamic pricing trends.
- *Dynamic Pricing and Discounts:* Admins can implement AI-driven pricing adjustments for off-peak hours or offer discounts on less popular menu items to improve sales.
- *AI-Powered Upsell Suggestions:* Based on sales data, the admin receives AI-driven insights to suggest upsell opportunities (e.g., recommending side dishes with main courses).
- *Customer Insights:* The admin can analyze customer behavior, preferences, and loyalty metrics to optimize the menu and promotional strategies.

## Delivery Person:

- *Update Delivery Status:* The delivery person can update the status of an order (e.g., "Out for Delivery," "Delivered").
- *Manage Delivery Routes:* The delivery person receives optimized delivery routes to reduce delivery times and improve efficiency.

## 4.2 Class Diagram

The class diagram provides an overview of the main components and relationships within the Ahar24 system. It represents the system's key entities, their attributes, and the methods they provide, as well as how these entities interact with each other. The diagram has been updated to reflect new features such as AI-powered recommendations, dynamic pricing, and customer analytics.

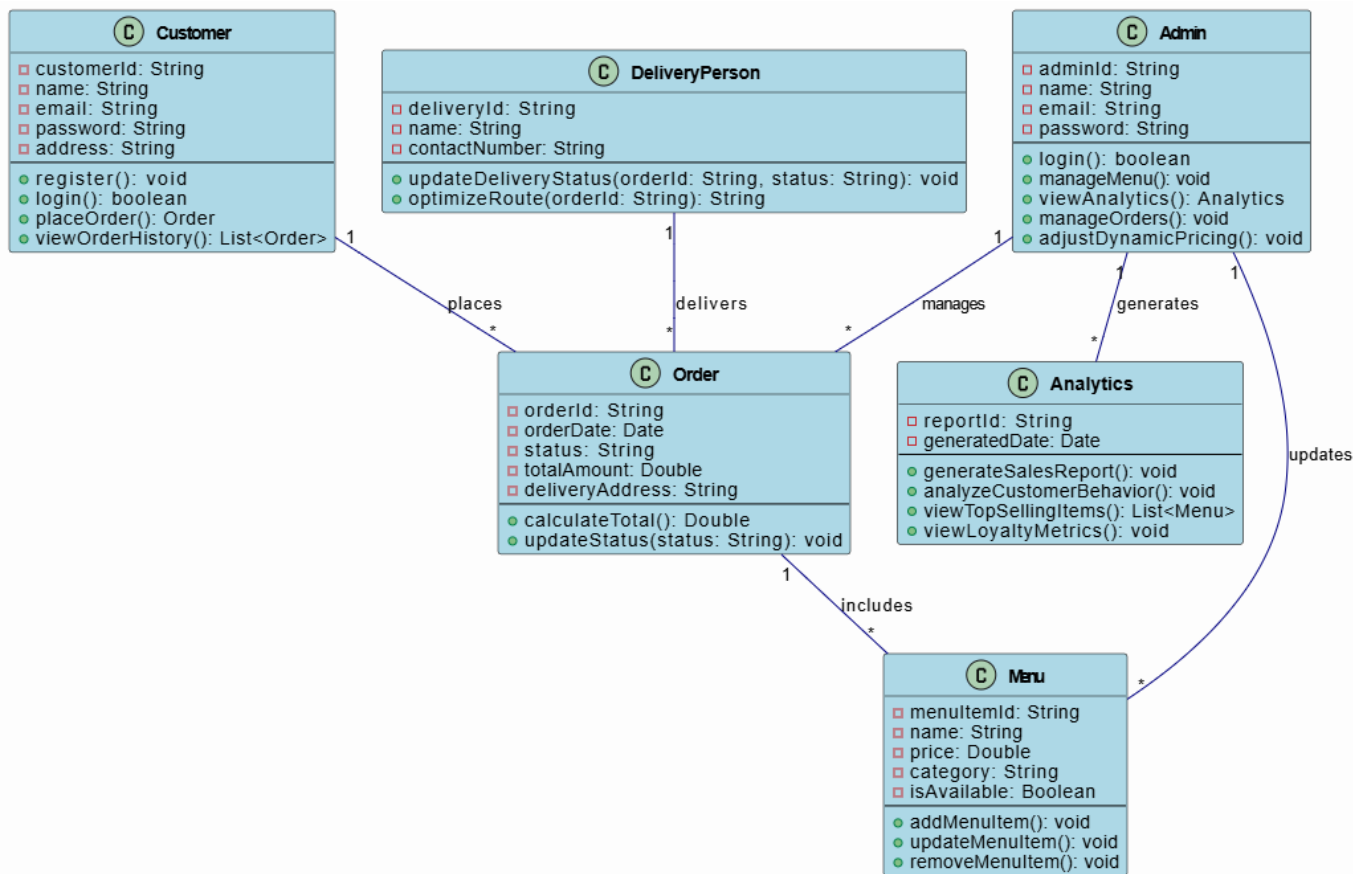


Figure 4.2: Class Diagram

**Customer:** The *Customer* class represents an individual who interacts with the food delivery system. Customers can browse the menu, place orders, view their order history, track the status of their orders, and view statistics. The class includes attributes such as:

- **id:** Unique identifier for the customer.
- **name:** Name of the customer.

- **email:** Email address for communication.
- **address:** Delivery address of the customer.
- **loyaltyPoints:** The loyalty points the customer has accumulated for rewards and discounts.
- **preferences:** Dietary preferences or restrictions of the customer (e.g., vegetarian, gluten-free).

Methods available to the customer include browsing the menu, placing orders, viewing their order history, tracking current orders, receiving personalized recommendations, and analyzing their spending statistics.

**Admin:** The *Admin* class represents the administrator responsible for managing the system. The admin can manage menu items, view orders, update their statuses, and access system-wide statistics. This class contains attributes such as:

- **id:** Unique identifier for the admin.
- **name:** Name of the admin.
- **email:** Contact email for the admin.
- **role:** The admin's role within the system (e.g., full admin, inventory manager).

The methods allow the admin to perform administrative tasks, including managing the menu, updating order statuses, viewing analytics, implementing dynamic pricing, and receiving AI-powered upsell suggestions.

**MenuItem:** The *MenuItem* class represents individual food items available for order. Each item has:

- **id:** Unique identifier for the menu item.
- **name:** Name of the menu item.
- **price:** Price of the menu item, which can be adjusted dynamically.
- **category:** Category of the menu item (e.g., appetizer, main course).
- **isAvailable:** Availability status of the item.
- **tags:** AI-generated tags (e.g., spicy, vegan) to facilitate search and recommendations.

Customers can view the details of each menu item, while the admin can manage these items and update their availability.

**Order:** The *Order* class holds information about customer orders, including the order ID, date of the order, and the current status of the order (e.g., pending, dispatched, or delivered). The class provides methods to fetch details about orders, update their status, and calculate the total price, including any dynamic pricing or discounts applied.

**Statistics:** The *Statistics* class is responsible for generating and retrieving statistical data, both for customers (e.g., order history, total spending) and for admins (e.g., total sales, popular menu items). This class also includes methods for providing AI-driven insights such as:

- **generateCustomerInsights():** Analyzes customer behavior and preferences, providing data for personalized recommendations.
- **generateSalesReport():** Generates detailed sales reports, including insights on dynamic pricing and promotional effectiveness.

**Payment:** The *Payment* class manages the details of payments made for orders. It includes:

- **id:** Unique identifier for the payment.
- **orderId:** ID of the associated order.
- **paymentMethod:** Payment method used (e.g., credit card, Stripe).
- **paymentStatus:** Status of the payment (e.g., completed, failed).
- **totalAmount:** Total amount paid for the order, including any dynamic pricing adjustments.

**DeliveryPerson:** The *DeliveryPerson* class represents the individuals who deliver the orders to the customers. It includes:

- **id:** Unique identifier for the delivery person.
- **name:** Name of the delivery person.
- **currentRoute:** The current route being followed by the delivery person for an order.

## 4.3 Data Flow Diagram

The Data Flow Diagram (DFD) depicted in Figure 4.3 outlines the interactions between various components of the *Ahar24* system. This DFD visualizes how data flows between external entities, the frontend and backend systems, the database, and the payment gateway. The diagram has been updated to reflect new features such as AI-powered recommendations, dynamic pricing, and personalized customer insights.

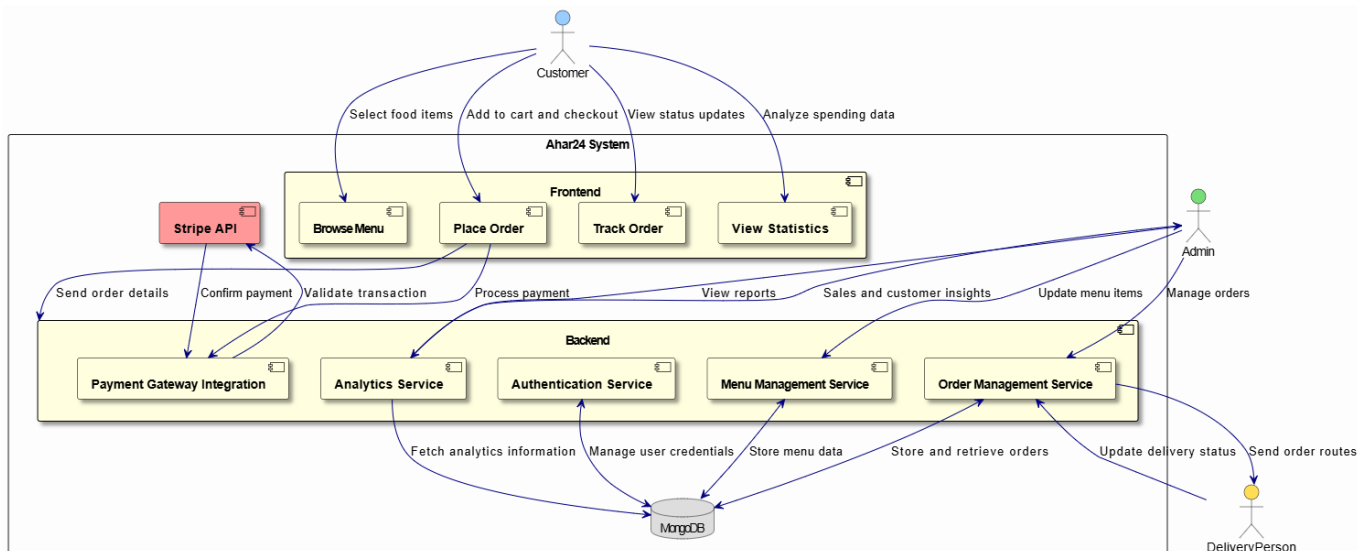


Figure 4.3: Data Flow Diagram

- **Customer:** The customer interacts with the frontend of the system, including activities such as browsing the menu, logging in or signing up, viewing their cart, placing orders, and checking spending statistics. Additionally, the customer benefits from AI-driven personalized recommendations, which suggest items based on past orders and preferences.
- **Admin:** The admin is responsible for managing food items, updating menu data, viewing customer orders, analyzing system reports, and setting dynamic pricing. AI-driven insights help the admin with upsell recommendations and tracking customer behavior.
- **Frontend:** The frontend communicates directly with both the customer and the backend. It receives customer data such as sign-in details, orders, preferences, and browsing activities, and forwards them to the backend for processing. The frontend also interacts with AI models to display dynamic recommendations and filters based on user preferences.
- **Backend:** The backend serves as the core processing unit, handling requests from the frontend. It processes customer orders, manages user authentication, calculates dynamic pricing, and updates the system based on admin actions. The backend also handles AI-based recommendation requests and pricing adjustments, ensuring a seamless user experience.

- **Database:** The database stores all necessary information, including customer details, order histories, menu items, and customer preferences. It is queried by the backend for various operations, including fetching reports, menu data, customer preferences, and order details. The database also stores customer loyalty points and the results of AI-driven analytics.
- **Payment Gateway:** The payment gateway handles online payment processing, including credit card transactions via Stripe and Cash on Delivery (COD) options for orders placed by customers. The payment gateway notifies the backend once the payment is confirmed, and the order status is updated accordingly.

## 4.4 ERD Diagram

The Entity Relationship Diagram (ERD) for the Ahar24 project represents the key entities involved in the food delivery management system, along with their attributes and relationships. This ERD has been updated to include the new features such as AI-driven recommendations, dynamic pricing, and enhanced customer insights.

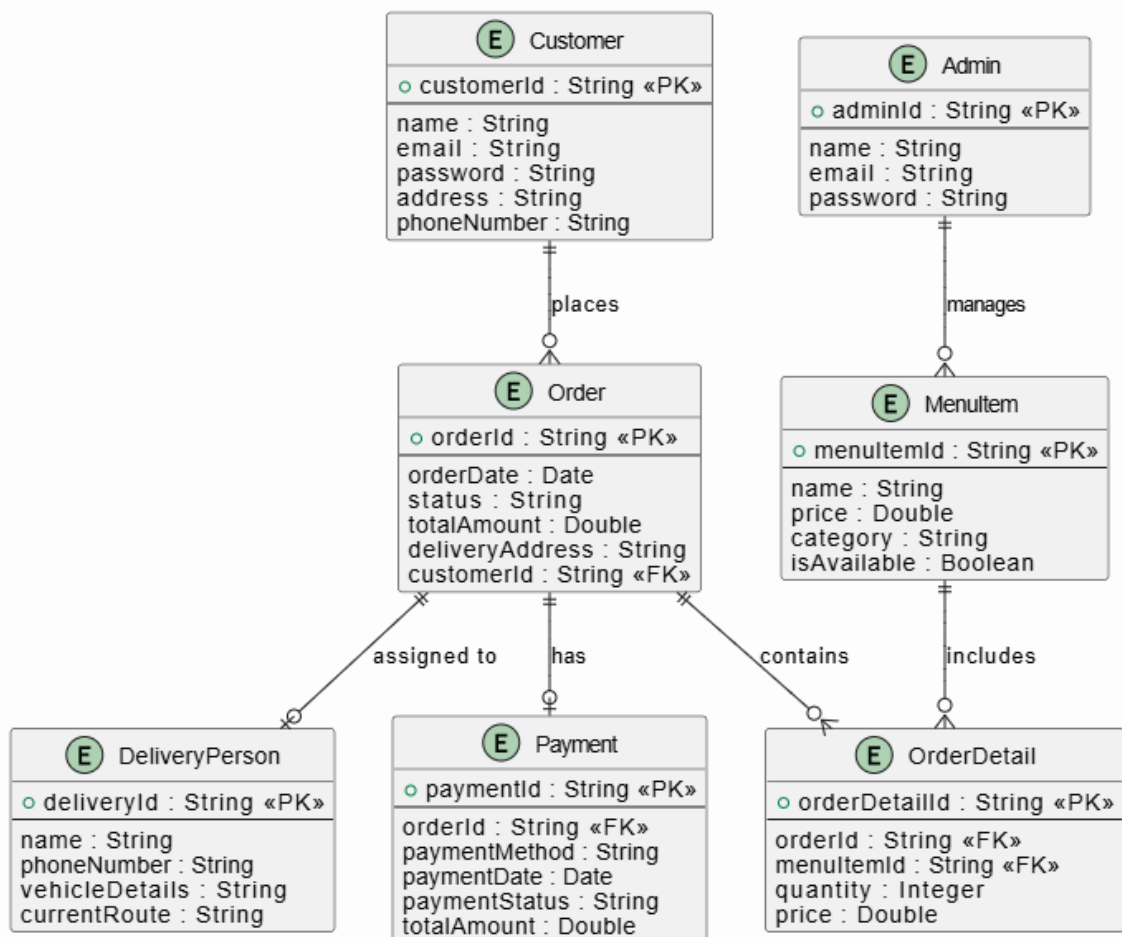


Figure 4.4: Entity Relationship Diagram (ERD)

The main entities include:



- **Customer:** Represents the user of the food delivery system. Each customer has attributes such as `customer_id`, `name`, `email`, `phone`, `address`, `password`, `preferences`, and `loyalty_points`. The `preferences` attribute captures dietary restrictions (e.g., vegetarian, gluten-free), and `loyalty_points` tracks customer rewards.
- **Order:** Contains details about the orders placed by customers, with attributes like `order_id`, `order_date`, `total_amount`, `status`, and `delivery_address`.
- **MenuItem:** Holds information about food items available for order, including `menu_id`, `item_name`, `price`, `category`, and `availability`. The price can be dynamically adjusted based on demand or promotions.
- **Cart:** A weak entity that stores items added by a customer before placing an order, with attributes like `cart_id`, `quantity`, `item_price`, and `menu_id`. The cart is linked to the `MenuItem` entity.
- **Admin:** The administrator of the system, responsible for managing the menu and viewing customer behavior, with attributes such as `admin_id`, `username`, `email`, and `password`.
- **Payment:** Records the method and status of payment for each order, with attributes like `payment_id`, `order_id`, `payment_method`, `payment_status`, and `total_amount`.
- **Analytics:** Holds customer and sales data for AI-based insights, such as popular items, customer preferences, and dynamic pricing trends. Attributes include `report_id`, `generated_date`, and methods for generating customer behavior and sales reports.
- **Recommendation:** Stores personalized recommendations for each customer based on past order data, preferences, and seasonal trends, with attributes like `recommendation_id`, `customer_id`, `item_id`, and `recommendation_score`.

### Relationships:

- A `Customer` places one or more `Orders`.
- An `Order` contains one or more items in the `Cart`.
- A `Cart` adds items from the `MenuItem`.
- A `Customer` maintains a `Cart`.
- An `Order` includes a `Payment`, which records the method and status of payment.
- An `Admin` manages the `MenuItem`.
- A `Customer` receives `Recommendations` based on order history and preferences.
- An `Admin` views `Analytics` data to optimize sales, identify customer trends, and adjust dynamic pricing.

# Chapter 5

## Features and Functionalities

### 5.1 Customer Side Features

The customer side of the Ahar24 system is designed to provide a seamless and personalized user experience. Key features include:

- **Browse and Select Food:** Customers can explore food items from various categories with an intuitive interface and AI-powered recommendations tailored to their preferences and past orders.
- **Add to Cart and Modify Quantity:** Users can add items to their cart, adjust quantities, and proceed to checkout with ease.
- **Order Tracking:** Customers can view order history and track the status of their current orders in real-time.
- **Spending Insights:** A dedicated graph displays daily spending statistics, helping users track their expenses over time.
- **Smart Menu Search and Filters:** Customers can use AI-driven natural language queries like "Show me spicy vegetarian dishes under 10 taka" or apply filters for dietary preferences, ingredients, and calorie counts.
- **Chatbot Integration:** A conversational AI chatbot enables users to place orders directly from the homepage, offering a modern and interactive experience.

### 5.2 Admin Dashboard Features

The admin dashboard provides advanced tools and analytics for effective restaurant management:

- **Order Management:** Monitor, update, and fulfill incoming orders in real-time.
- **Data-Driven Insights:** Analyze sales and customer behavior through visual graphs, including:
  - Top 5 ordered items.

- Total order value of every customer.
- Daily spendings of customers.
- Overall order value distribution visualized in a donut chart.
- **Menu Management:** Add, update, or delete menu items, including price adjustments and availability.
- **Customer Data Access:** View detailed customer order history and spending patterns for better service and targeted marketing.
- **Dynamic Pricing and Promotions:** Use AI recommendations to apply discounts during off-peak hours or upsell side dishes with main courses.
- **Demand Forecasting:** Predict demand for specific items using historical data and weather patterns, ensuring optimal stock and preparation planning.

## 5.3 Order Management

Order management is a key functionality of the Ahar24 system, ensuring smooth operations:

- **Online Order Placement:** Customers can place orders through the website or chatbot, with real-time tracking of status and delivery progress.
- **Admin Controls:** Admins can monitor, update, and fulfill orders from the dashboard, ensuring timely preparation and delivery.
- **Notifications:** Both customers and admins receive notifications about key order status updates, enhancing transparency and efficiency.

## 5.4 Inventory Management

The inventory management module helps maintain smooth restaurant operations:

- **Stock Tracking:** Monitor stock levels of food items in real-time to avoid shortages or overstocking.
- **Low-Stock Alerts:** Receive automated alerts for items nearing depletion to ensure timely restocking.
- **Dashboard Integration:** Admins can update inventory levels directly from the dashboard for real-time synchronization with menu availability.
- **Preparation Optimization:** AI-generated suggestions help prepare stock for anticipated demand during peak hours based on historical data.

## 5.5 User Authentication and Authorization

The Ahar24 system implements secure mechanisms for user authentication and role-based access control:

- **Secure Login:** Customers and admins must authenticate using password-protected accounts, ensuring access only to authorized users.
- **JWT Authentication:** User sessions are secured using JSON Web Tokens, which provide encrypted and tamper-proof authentication.
- **Role-Based Access Control:** Functionality is separated by user roles:
  - **Customers:** Access features such as menu browsing, order placement, and spending analytics.
  - **Admins:** Access tools for managing orders, inventory, menu, and customer data.

# Chapter 6

## User Interface Design

The customer interface of the Ahar24 system is designed to deliver a seamless and personalized user experience. It combines intuitive navigation with advanced features to meet the needs of modern food delivery users.

- **Homepage:** The homepage serves as an entry point, showcasing featured food items, popular categories, personalized recommendations, and current offers. Dynamic suggestion banners, such as "You might like...", provide users with AI-driven suggestions based on past orders and preferences.
- **Food Menu:** Customers can browse through categories of food items, each presented with a clear image, description, and price. Smart menu search with natural language queries (e.g., "Show me spicy vegetarian dishes under 10 taka") and filters for dietary preferences, ingredients, and calorie counts simplify navigation.
- **Cart System:** Customers can add items to their cart, modify quantities, and proceed to checkout. The streamlined checkout process includes delivery options and supports Cash on Delivery (COD).
- **Order History and Tracking:** Users can view their past orders with details like items, delivery time, and total cost, and even reorder with one click. Real-time tracking provides updates on current orders, including status indicators (e.g., preparing, out for delivery, delivered) and estimated delivery times.
- **Spending Statistics:** A dedicated section displays graphical insights into daily spending trends, allowing users to manage their budgets effectively.
- **Chatbot Integration:** Customers can interact with an AI-powered chatbot to browse menus, place orders, and receive updates directly through a conversational interface.

The customer interface is tailored to provide a user-friendly and engaging platform for both first-time visitors and loyal customers.

### 6.1 Admin Interface

The admin interface is designed to offer comprehensive tools and insights for restaurant managers, enabling efficient operations and data-driven decision-making.

- **Dashboard Overview:** The dashboard provides a summary of key performance indicators (KPIs), such as total orders, revenue, and customer feedback. Visual analytics include:
  - Top 5 ordered items.
  - Total order value of every customer.
  - Daily customer spending trends.
  - Overall order value distribution via a donut chart.
- **Order Management:** Admins can monitor and update orders in real-time, with notifications sent to customers for key status updates (e.g., confirmed, preparing, delivered).
- **Menu Management:** The admin interface allows for immediate updates to the menu, including adding new items, modifying prices, and managing availability. AI-driven tagging automatically categorizes items as spicy, vegan, or gluten-free.
- **Customer Management:** Admins have access to detailed customer profiles, enabling them to view order history, spending patterns, and feedback. This facilitates targeted marketing and loyalty initiatives.
- **Reports and Analytics:** A detailed analytics section offers insights into sales trends, peak ordering times, and inventory usage, helping admins optimize operations and predict demand.
- **Dynamic Pricing and Upselling:** AI-powered recommendations suggest dynamic pricing strategies during off-peak hours and promote complementary items (e.g., side dishes or drinks) with main courses.

The admin interface combines functionality and insights to streamline restaurant operations and enhance profitability.

## 6.2 Responsive Design Considerations

The Ahar24 platform employs responsive web design principles to ensure optimal performance across all devices and screen sizes, providing a consistent experience for both customers and admins.

- **Mobile Compatibility:** The UI is optimized for mobile devices, enabling users to browse menus, place orders, and track deliveries seamlessly. A touch-friendly design with larger buttons and simplified navigation ensures accessibility.
- **Adaptive Layouts:** The layout adjusts automatically based on the screen size. For instance, smaller screens display menu items in a vertical list format, while larger screens use a grid layout for better visualization.
- **Scalable Graphics:** All icons, charts, and images are rendered in scalable formats (e.g., SVG), ensuring clarity and quality across devices without distortion.

- **Thorough Device Testing:** The platform has been rigorously tested on desktops, laptops, tablets, and smartphones, ensuring seamless functionality and a consistent user experience.
- **Cross-Browser Compatibility:** Ahar24 supports all major web browsers, including Chrome, Firefox, Safari, and Edge. The design ensures consistent performance and rendering across browsers.

The responsive design of Ahar24 ensures that users enjoy a smooth and efficient experience, regardless of their device or browser preferences.

# Chapter 7

## Implementation

The implementation of the Ahar24 system involved developing various components, each serving distinct roles in the system architecture. This section details the steps and technologies used in building the frontend, backend, database, API integration, and testing, ensuring the system meets all functional and performance requirements.

### 7.1 Frontend Development

The frontend of Ahar24 was developed using React JS, a robust JavaScript library well-suited for creating dynamic and responsive user interfaces. The frontend focuses on delivering a seamless experience for both customers and administrators while integrating advanced features.

- **Component-Based Architecture:** React JS's component-based structure was used to develop reusable components, such as the menu display, chat-bot interface, order tracking, and analytics sections. These components were integrated into a cohesive, user-friendly system.
- **AI-Powered Features:** Features like smart menu search with natural language understanding and personalized food recommendations were implemented, allowing users to find items effortlessly and receive tailored suggestions.
- **Responsive UI Design:** Modern UI/UX principles and CSS frameworks like Bootstrap ensured that the interface is intuitive and adapts to all devices, from desktops to smartphones. Adaptive layouts and scalable graphics enhance usability across screen sizes.
- **State Management with Redux:** Redux was employed to manage the global application state efficiently. This was critical for features like cart management, real-time order tracking, and AI-driven dynamic updates.
- **React Router for Navigation:** Smooth navigation between key pages, including the homepage, menu, cart, order history, and admin dashboard, was achieved using React Router, ensuring a fast and dynamic user experience.



## 7.2 Backend Development

The backend of Ahar24, built with Node.js and Express.js, serves as the backbone of the system, handling server-side logic, API integration, and secure communication with the database and frontend.

- **Scalable Architecture:** Node.js, with its non-blocking, asynchronous nature, supports high concurrency, making it ideal for real-time features like live notifications and order updates.
- **RESTful APIs:** Express.js was used to create RESTful APIs that manage routing, middleware, and data exchange. These APIs facilitate secure and efficient communication between the system's components.
- **Security and Authentication:** Middleware was implemented for data validation and JWT-based authentication, ensuring secure access to sensitive features like order placement and admin dashboard updates.
- **Real-Time Features:** Technologies like WebSockets or Socket.io were integrated for real-time communication, enabling instant updates on order statuses and dynamic notifications for both customers and admins.
- **AI-Driven Backend Logic:** The backend processes dynamic pricing strategies, upselling suggestions, and demand predictions using AI algorithms, enhancing the system's intelligence and operational efficiency.

## 7.3 Database Implementation

Ahar24 uses MongoDB Atlas as its primary database, leveraging the NoSQL database's flexibility and scalability to handle dynamic data structures and large volumes of transactions.

- **NoSQL Flexibility:** MongoDB's schema-less structure allows for the efficient storage of diverse data types, such as customer details, orders, menu items, and analytics reports.
- **Data Modeling:** Collections for users, orders, and menu items were designed to manage relationships effectively. Embedded documents simplify queries for nested data, such as order items within an order record.
- **Indexing and Performance:** Frequently queried fields, like user IDs, order statuses, and menu categories, were indexed to optimize query performance and reduce latency in customer-facing and admin-facing features.
- **Database Security:** MongoDB Atlas provides encryption at rest, secure access control with role-based permissions, and automated backups to ensure data integrity and security.

## 7.4 API Integration

API integration was implemented to connect Ahar24 with external services while ensuring secure and real-time data communication.

- **JWT-Based Security:** APIs were secured using JSON Web Tokens (JWT), validating every request to ensure secure access to features like order processing, menu management, and analytics reporting.
- **AI Services:** APIs were developed to support AI-powered functionalities, such as natural language search and personalized recommendations, integrating machine learning models into the backend workflows.
- **Error Logging and Debugging:** Comprehensive error-handling mechanisms captured and logged issues during API interactions, ensuring prompt identification and resolution of any disruptions.

## 7.5 Testing and Debugging

Ahar24 underwent rigorous testing to ensure reliability, scalability, and seamless performance across its components. Various testing methodologies were employed:

- **Unit Testing:** Critical functionalities, such as user authentication, AI-driven recommendations, and cart management, were tested using Jest and Mocha. Automated tests ensured the correctness of individual components.
- **Integration Testing:** Frontend-backend integration and backend-database interactions were validated to ensure data consistency and smooth communication.
- **End-to-End Testing:** Tools like Cypress were used to simulate real-world user journeys, including browsing the menu, placing orders, and tracking deliveries.
- **Performance Testing:** Stress tests were conducted to evaluate system responsiveness and stability under peak traffic. Results showed the ability to handle high concurrency with minimal latency.
- **Debugging and Monitoring:** Chrome Developer Tools and Node.js Debugger were used to identify and resolve frontend and backend issues. Logs from MongoDB and API interactions were analyzed to debug and improve system reliability.

By combining thorough testing and debugging with advanced features, Ahar24 was optimized for efficiency, scalability, and user satisfaction, meeting the requirements of both customers and administrators.

# Chapter 8

## Results

The implementation of the Ahar24 system yielded significant results in functionality, performance, and user experience. This section outlines the key outcomes observed in customer interaction, order placement processes, admin dashboard insights, and performance metrics obtained from load testing. These results highlight the system's efficiency and reliability in handling real-world food delivery operations.

### 8.1 Customer Interaction and Order Placement

The primary goal of Ahar24 was to offer customers a seamless and intuitive food ordering experience. The system exceeded expectations by providing a user-centric interface that streamlined the entire ordering process.

- **Enhanced User Interface:** The customer-facing UI, designed with modern UX principles, was praised for its simplicity and responsiveness. Features such as dynamic suggestion banners and personalized food recommendations improved the overall user experience, helping customers discover items tailored to their preferences.
- **Order Customization and Flexibility:** Customers could personalize their orders through features like portion size selection, dietary preferences, and customizable toppings. This flexibility improved user satisfaction by allowing them to tailor meals according to their preferences.
- **Smart Menu Search and Filters:** The AI-driven search functionality enabled users to find items quickly using natural language queries like "Show me spicy dishes under 10 taka" or apply filters for cuisine, ingredients, or calorie counts.
- **Real-Time Notifications and Tracking:** Customers received real-time updates at each stage of the order process, such as order confirmation, preparation, and dispatch. The tracking interface provided transparency and increased user trust by displaying estimated delivery times and live status updates.
- **Spending Insights and Analytics:** A dedicated statistics section allowed users to track their daily spending and analyze their order history through graphical representations. This feature encouraged budgeting and improved overall customer engagement.

- **Chatbot Interaction for Ordering:** The chatbot integration allowed users to place orders conversationally, offering a modern and engaging way to interact with the platform.
- **Improved Retention Rates:** The combination of intuitive navigation, personalized experiences, and seamless interactions contributed to higher customer retention, with users returning frequently for repeat orders.

These features collectively ensured a streamlined and satisfying experience for customers, positioning Ahar24 as a reliable and customer-friendly platform.

## 8.2 Admin Dashboard Insights

The admin dashboard was designed to provide restaurant managers with actionable insights and operational control. The results demonstrated its effectiveness in empowering admins to make data-driven decisions and optimize business operations.

- **Comprehensive Order Management:** Admins could oversee ongoing, completed, and canceled orders in real-time. Filters for date, customer, and status enabled efficient prioritization and streamlined operations during peak periods.
- **AI-Driven Analytics:** Visual reports, including bar charts of top-selling items and line graphs of daily revenue trends, provided valuable insights into customer preferences and sales performance. This data enabled managers to refine menus and optimize promotions.
- **Customer Behavior Insights:** The dashboard displayed detailed customer profiles with order history and spending patterns. These insights helped managers identify loyal customers and create personalized promotions, boosting customer engagement.
- **Revenue and Performance Metrics:** Graphical representations of revenue breakdowns, including pie charts of total order value distribution, allowed admins to evaluate performance and forecast trends accurately. This data was critical for inventory planning and staffing.
- **Dynamic Pricing and Upselling Opportunities:** AI-powered features suggested discounts during off-peak hours and upselling recommendations for complementary items. This functionality increased average order value and improved profitability.
- **Demand Prediction and Preparation Optimization:** The dashboard leveraged historical and environmental data to forecast demand for specific items, ensuring efficient preparation during peak hours and minimizing waste.

The admin dashboard was instrumental in enhancing operational efficiency and driving business growth through data-driven strategies.

## 8.3 Performance and Load Testing

Extensive testing was conducted to validate the system's ability to handle high traffic and real-world scenarios. The results underscored the scalability, reliability, and robustness of Ahar24 in demanding environments.

- **Load Handling and Scalability:** The system successfully managed hundreds of concurrent users placing orders during peak conditions without crashes or performance degradation. Horizontal scaling was implemented to accommodate future growth across multiple locations.
- **Optimized Response Times:** The average response time was consistently maintained below 300ms for key operations, such as menu browsing and order placement, ensuring a smooth user experience even under high traffic.
- **Database Efficiency:** MongoDB's indexing and NoSQL flexibility facilitated rapid data access, enabling efficient order processing and admin reporting. The system performed exceptionally well even with large datasets.
- **Stress Testing and Failure Recovery:** Stress tests simulated extreme conditions, such as server overloads and network failures. The system demonstrated resilience, with minimal downtime and quick recovery, ensuring reliability in real-world operations.
- **Resource Optimization:** Memory, CPU, and bandwidth usage were closely monitored during testing to ensure efficient resource utilization. The system maintained optimal performance without excessive resource consumption.
- **Elastic Infrastructure:** The system's architecture supported elastic scaling by adding server instances during load peaks, ensuring uninterrupted service during high-demand periods.

These testing results confirmed that Ahar24 is a highly reliable and scalable platform capable of supporting demanding operational requirements in the food delivery sector.

# Chapter 9

## Discussion

The development of Ahar24, a modern restaurant food delivery management system, involved various challenges, solution approaches, and considerations for future improvements. This section discusses the difficulties encountered during the development process, the strategies employed to address these challenges, and potential enhancements that can be implemented in future iterations of the system.

### 9.1 Challenges Faced During Development

Several challenges arose during the development of the Ahar24 platform, spanning both the frontend and backend components as well as the overall system architecture. Key challenges included:

- **Scalability and Performance Optimization:** Ensuring the system could handle a growing number of customers, restaurants, and real-time analytics was critical. With new features such as AI-driven recommendations, smart search, and dynamic pricing, horizontal scaling and load balancing were essential to distribute the load efficiently. Additionally, advanced database optimization strategies became a necessity to maintain performance.
- **AI Integration for Recommendations and Search:** Implementing AI-driven personalized recommendations and natural language-based smart search posed unique challenges. Training models on limited datasets, managing response times for AI algorithms, and integrating these seamlessly with the core system required meticulous planning and testing.
- **User Authentication and Security:** Implementing secure user authentication and ensuring the protection of sensitive data such as payment details were crucial. The addition of dynamic pricing and personalized discounts introduced further complexity, requiring robust encryption and validation mechanisms to prevent misuse or unauthorized access.
- **Real-time Order Updates and Notifications:** Providing real-time updates on order statuses for customers and restaurant staff, especially during peak hours, was a significant technical challenge. Handling frequent updates for features like estimated delivery times, pre-order notifications, and real-time demand predictions required a reliable WebSocket implementation.

- **Frontend Responsiveness and Compatibility:** Enhancing the user experience with features like dynamic suggestion banners, statistical analytics, and detailed filter-based searches required the frontend design to be not only responsive but also visually appealing across various devices. Ensuring smooth functionality for these advanced features on mobile, tablet, and desktop devices posed additional challenges.

These challenges required in-depth technical expertise, strategic planning, and innovative problem-solving throughout the development phase.

## 9.2 Solution Approaches

To overcome the challenges encountered during the development of Ahar24, several solution approaches were adopted, each tailored to address specific technical and functional obstacles:

- **Horizontal Scaling and Load Balancing:** To handle increased traffic, the system was designed to scale horizontally by distributing load across multiple servers using load balancers. This ensured smooth operation during peak times and supported real-time data flow for features like AI recommendations and notifications.
- **Advanced Database Optimization and Indexing:** To manage the growing complexity of queries, particularly for smart search and customer analytics, indexing was implemented on key fields such as customer preferences, order history, and product attributes. Additionally, caching techniques were applied to reduce redundant queries, and data aggregation pipelines were optimized to handle real-time analytics.
- **AI Model Integration:** For personalized recommendations and smart search, lightweight AI models were integrated into the backend. Pre-trained models were fine-tuned using customer data (e.g., past orders and preferences) to deliver accurate recommendations. A robust API layer was built to handle AI-driven queries efficiently.
- **JWT Authentication and Enhanced Security Protocols:** To address security concerns, JSON Web Tokens (JWT) were used for session management, and sensitive data like passwords and discounts were encrypted using AES protocols. HTTPS was enforced across all endpoints to secure data transmission. Additional logging mechanisms were added to monitor suspicious activities, particularly in dynamic pricing features.
- **Real-time Communication with WebSockets:** WebSocket technology was implemented to support instant notifications, such as delivery updates, pre-order suggestions, and price adjustments. This reduced latency and ensured seamless communication between the server and clients, significantly enhancing user engagement.

- **Responsive Frontend Frameworks and Testing Tools:** The frontend, developed with React.js, utilized CSS-in-JS libraries and media queries to ensure adaptability across different screen sizes. Features like smart search filters and recommendation banners were optimized for performance and usability. Comprehensive testing using tools like BrowserStack ensured compatibility across devices and browsers.

These solution approaches addressed both existing and newly introduced challenges, ensuring the system's robustness, scalability, and user-centric design while integrating advanced features.



# Chapter 10

## Conclusion

In this section, we reflect on the work completed for the development of the Ahar24 platform, its contributions to the food delivery domain, and the potential future scope of this project. The conclusion encapsulates the primary achievements and highlights how this system can be further extended and refined to adapt to evolving technological and business needs.

### 10.0.1 Summary of Work Done

The primary objective of this project was to develop a modern and robust food delivery management system, Ahar24, which caters to the needs of both customers and restaurant administrators. The development process involved designing a highly interactive user interface for customers and administrators, building a scalable backend system, integrating secure payment solutions, and incorporating advanced AI-driven features to enhance user experience.

On the frontend, the customer interface was developed using `React.js`, ensuring a smooth and responsive user experience. Key functionalities, such as placing orders, tracking orders in real-time, viewing order history, interacting with a dynamic cart, and accessing personalized recommendations, were implemented. The frontend also includes responsive design considerations, making the platform compatible across various devices.

The backend was developed using `Node.js` and `Express.js`, where RESTful APIs were created to handle data communication between the frontend and the MongoDB database. A secure authentication system was implemented using JWT (JSON Web Tokens), ensuring secure user registration, login, and authorization. Additionally, MongoDB was utilized for data storage, while the integration with MongoDB Atlas enabled cloud database management and real-time analytics for customer behavior. The admin dashboard was designed to empower restaurant administrators with tools for monitoring sales, orders, customer insights, and inventory management. Advanced features such as AI-powered dynamic pricing, upsell suggestions, and smart search analytics were integrated, providing a comprehensive toolkit for optimizing operations.

Extensive testing, including unit testing, end-to-end testing, and performance testing, ensured the reliability of the system. Furthermore, customer-exclusive features like statistical order history and admin insights into customer preferences were added, making the system robust and user-centric.

## 10.0.2 Contributions of the Project

The Ahar24 platform contributes significantly to the food delivery ecosystem by offering a comprehensive, user-friendly, and highly scalable solution for managing restaurant operations and food delivery services. The primary contributions of the project include:

- **Enhanced Customer Experience:** Personalized recommendations powered by AI, dynamic cart management, secure payment processing, and real-time notifications ensure a seamless and engaging experience for customers.
- **Comprehensive Admin Tools:** Administrators benefit from features like inventory management, order tracking, sales analytics, customer behavior insights, and dynamic pricing recommendations, empowering data-driven decision-making.
- **AI Integration for Optimization:** Advanced AI algorithms provide personalized suggestions, upselling opportunities, and dynamic search results, ensuring relevance and efficiency for both customers and admins.
- **Scalability and Flexibility:** The system's modular design supports growth, allowing for the addition of new features like multi-restaurant support, geolocation services, and advanced customer analytics.
- **Secure Data and Payment Management:** Utilizing MongoDB for data storage and Stripe for secure payment processing ensures smooth and reliable transactions while safeguarding sensitive information.
- **Responsiveness and Accessibility:** Ahar24 is fully responsive, enabling users to access the platform across multiple devices and operating systems, broadening its appeal and usability.

By addressing key pain points in the food delivery process, Ahar24 represents a substantial improvement over existing systems and provides practical, innovative features for customers and restaurant owners alike.

## 10.0.3 Future Scope

While the Ahar24 platform offers a complete solution for modern restaurant food delivery management, several enhancements can be made in future versions to ensure its continued relevance and competitiveness in the market. The potential future scope of the project includes:

- **AI-Driven Personalized Features:** Further development of AI-based features to improve customer engagement, such as advanced recommendation systems based on real-time data, browsing history, and seasonal trends.
- **Geolocation and Delivery Optimization:** Adding geolocation services and route optimization algorithms to improve delivery efficiency and customer satisfaction.

- **Loyalty and Retention Programs:** Introducing loyalty programs and personalized discounts to encourage repeat orders and strengthen customer retention.
- **Multi-Language and Localization Support:** Enabling multi-language functionality and localized content to expand the platform's global reach and accommodate diverse user bases.
- **Multi-Restaurant Support:** Allowing users to browse and order from multiple restaurants within a single transaction, broadening the platform's applicability and user appeal.
- **Third-Party Delivery Integrations:** Collaborating with external delivery services for better scalability and coverage, especially for restaurants without in-house delivery systems.
- **AI-Driven Operational Support:** Expanding AI capabilities to include demand forecasting, pre-preparation suggestions for peak hours, and dynamic inventory management to optimize restaurant operations.
- **Advanced Analytics:** Enhancing analytics tools to include predictive trends, real-time customer sentiment analysis, and operational efficiency tracking.

These future enhancements would not only expand the functionality of Ahar24 but also maintain its competitiveness in an ever-evolving digital marketplace. By continuously improving the system's features and aligning with emerging technologies, Ahar24 can solidify its position as a leading platform in the restaurant food delivery management industry.

# Chapter 11

## Appendix

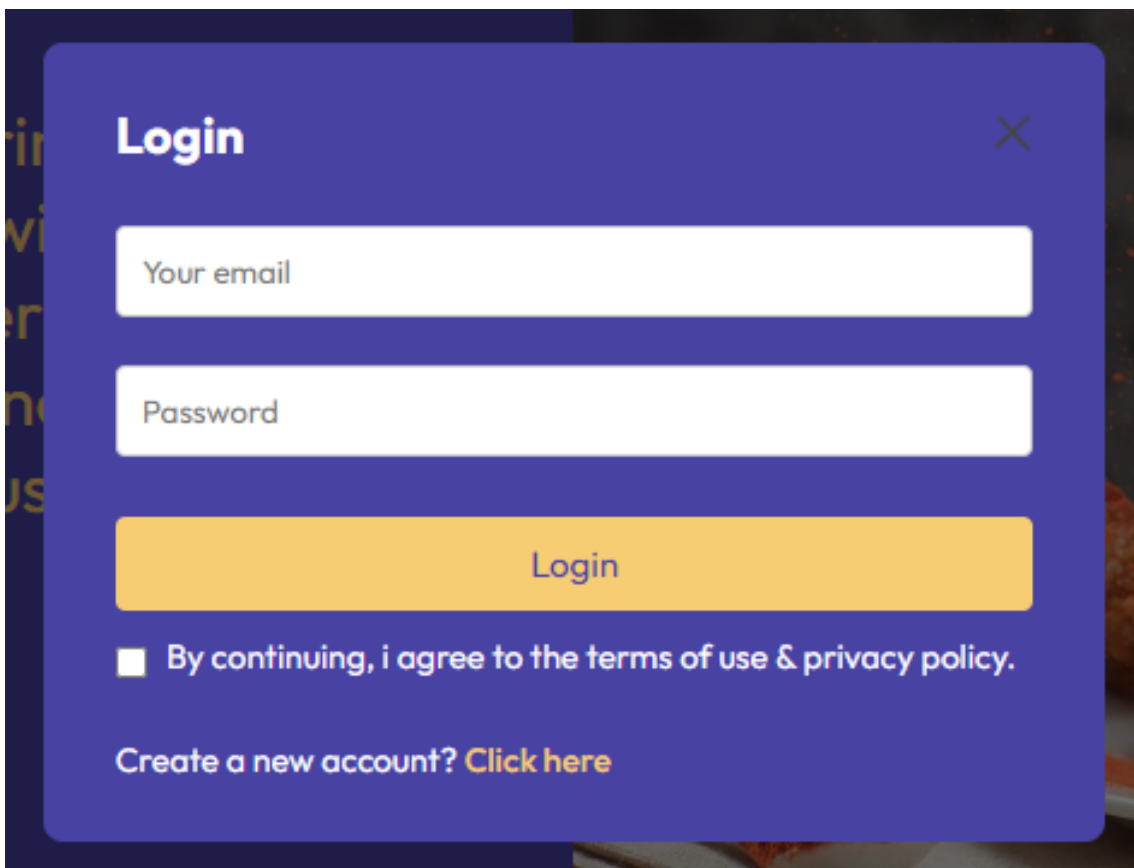


Figure 11.1: Login

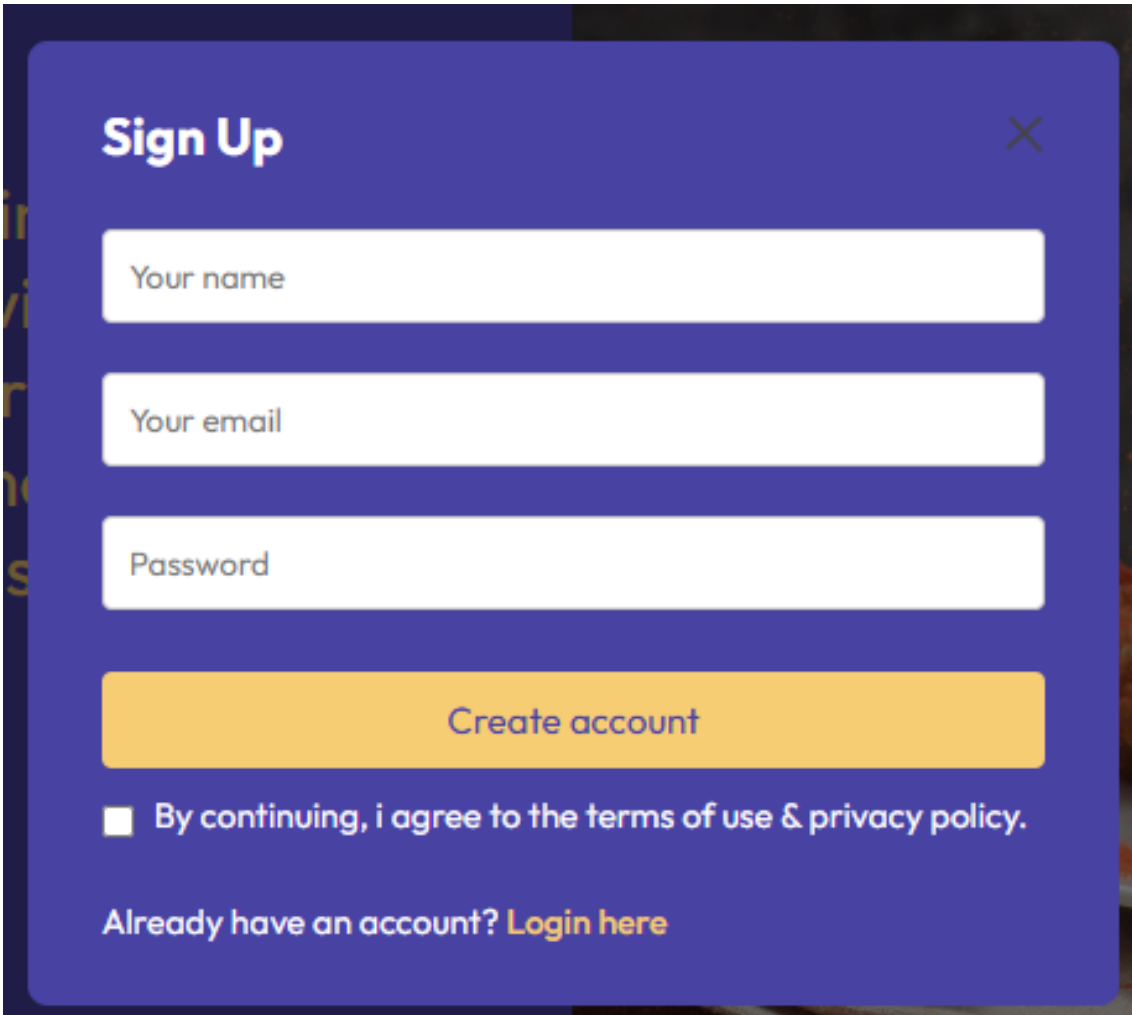


Figure 11.2: Sign Up

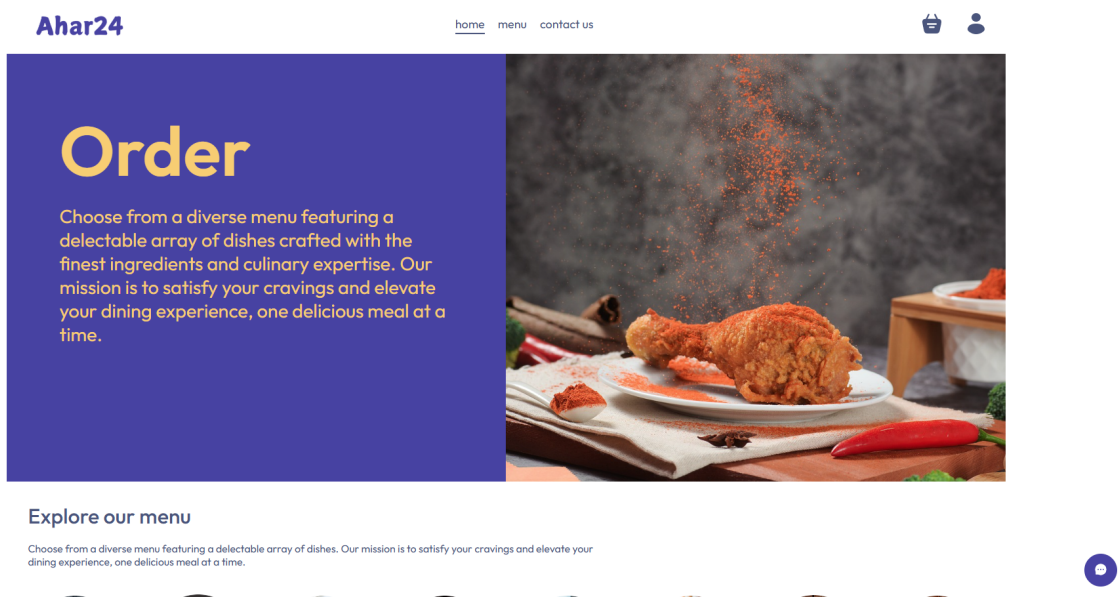
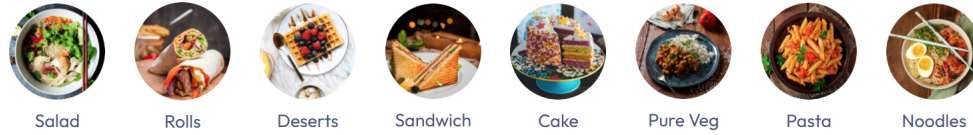


Figure 11.3: Header & Landing Page

## Explore our menu

Choose from a diverse menu featuring a delectable array of dishes. Our mission is to satisfy your cravings and elevate your dining experience, one delicious meal at a time.



## Top dishes for you






 <p><b>Greek salad</b> ★★★★★</p> <p>Greek salad is a refreshing Mediterranean dish made with fresh tomatoes, cucumbers, red onions, Kalamata olives, and feta cheese, all dressed in olive oil and seasoned with oregano. It's a light, flavorful salad.</p>	 <p><b>Veg salad</b> ★★★★★</p> <p>Veg salad is a simple and nutritious dish made with a variety of fresh vegetables like lettuce, cucumbers, tomatoes, carrots, and bell peppers. It's often seasoned with herbs and dressed with olive oil or a light vinaigrette, making it a refreshing and healthy option for any meal.</p>	 <p><b>Clover Salad</b> ★★★★★</p> <p>Clover salad is a unique and nutritious dish featuring tender clover leaves mixed with fresh vegetables like cucumbers, tomatoes, and onions. Often combined with a light vinaigrette or lemon dressing, this salad offers a mild, slightly sweet flavor and is packed with vitamins, making it a refreshing and healthy choice.</p>	 <p><b>Chicken Salad</b> ★★★★★</p> <p>Chicken salad is a flavorful and protein-packed dish made with cooked, shredded or diced chicken mixed with fresh vegetables like lettuce, cucumbers, and tomatoes. It can be enhanced with ingredients such as mayonnaise, yogurt, or a light vinaigrette, and often includes additions like celery, nuts, or dried fruits for added texture and flavor. Perfect as a meal on its own or a hearty side dish.</p>	 <p><b>Lasagna Rolls</b> ★★★★★</p> <p>Lasagna rolls are a delicious twist on traditional lasagna, made by rolling lasagna noodles around a savory filling of ricotta cheese, spinach, and ground meat or vegetables. The rolls are then topped with marinara sauce and melted mozzarella cheese, and baked to perfection. These individual, portion-sized rolls offer all the classic lasagna flavors in a fun and easy-to-serve format.</p>
---	--	--	---	---

Figure 11.4: Menu Categories

## Top dishes for you











 <p><b>Greek salad</b> ★★★★★</p> <p>Greek salad is a refreshing Mediterranean dish made with fresh tomatoes, cucumbers, red onions, Kalamata olives, and feta cheese, all dressed in olive oil and seasoned with oregano. It's a light, flavorful salad perfect for a healthy meal or side dish.</p> <p>₹350</p>	 <p><b>Veg salad</b> ★★★★★</p> <p>Veg salad is a simple and nutritious dish made with a variety of fresh vegetables like lettuce, cucumbers, tomatoes, carrots, and bell peppers. It's often seasoned with herbs and dressed with olive oil or a light vinaigrette, making it a refreshing and healthy option for any meal.</p> <p>₹280</p>	 <p><b>Clover Salad</b> ★★★★★</p> <p>Clover salad is a unique and nutritious dish featuring tender clover leaves mixed with fresh vegetables like cucumbers, tomatoes, and onions. Often combined with a light vinaigrette or lemon dressing, this salad offers a mild, slightly sweet flavor and is packed with vitamins, making it a refreshing and healthy choice.</p> <p>₹300</p>	 <p><b>Chicken Salad</b> ★★★★★</p> <p>Chicken salad is a flavorful and protein-packed dish made with cooked, shredded or diced chicken mixed with fresh vegetables like lettuce, cucumbers, and tomatoes. It can be enhanced with ingredients such as mayonnaise, yogurt, or a light vinaigrette, and often includes additions like celery, nuts, or dried fruits for added texture and flavor. Perfect as a meal on its own or a hearty side dish.</p> <p>₹180</p>	 <p><b>Lasagna Rolls</b> ★★★★★</p> <p>Lasagna rolls are a delicious twist on traditional lasagna, made by rolling lasagna noodles around a savory filling of ricotta cheese, spinach, and ground meat or vegetables. The rolls are then topped with marinara sauce and melted mozzarella cheese, and baked to perfection. These individual, portion-sized rolls offer all the classic lasagna flavors in a fun and easy-to-serve format.</p> <p>₹120</p>
 <p><b>Peri Peri Rolls</b> ★★★★★</p> <p>Peri Peri rolls are a spicy and flavorful dish.</p>	 <p><b>Chicken Rolls</b> ★★★★★</p> <p>Chicken rolls are a tasty and convenient.</p>	 <p><b>Veg Rolls</b> ★★★★★</p> <p>Veg rolls are a light and flavorful dish made.</p>	 <p><b>Ripple Ice Cream</b> ★★★★★</p>	 <p><b>Fruit Ice Cream</b> ★★★★★</p>

Figure 11.5: Menu Page



### Top dishes for you


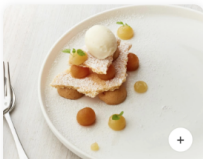


 <p><b>Ripple Ice Cream</b> ★★★★★</p> <p>Ripple Ice Cream is a smooth and creamy delight swirled with rich, flavorful ribbons of fruit or chocolate. Each spoonful offers a perfect balance of sweetness and texture, making it a refreshing and indulgent treat for any ice cream lover.</p> <p>₹160</p>	 <p><b>Fruit Ice Cream</b> ★★★★★</p> <p>Fruit Ice Cream is a refreshing blend of creamy goodness and real, vibrant fruits. Bursting with natural flavors, this ice cream offers a sweet and tangy twist, perfect for a light and fruity dessert.</p> <p>₹200</p>	 <p><b>Jar Ice Cream</b> ★★★★★</p> <p>Jar Ice Cream is a unique, indulgent treat served in a charming jar, layering rich, creamy ice cream with delightful toppings like sauces, nuts, or sprinkles. Perfect for those who enjoy a personalized dessert experience with every scoop!</p> <p>₹220</p>	 <p><b>Vanilla Ice Cream</b> ★★★★★</p> <p>Vanilla Ice Cream is a classic favorite, known for its smooth, creamy texture and rich, natural vanilla flavor. Simple yet satisfying, it's the perfect dessert on its own or paired with any topping for an extra touch of sweetness.</p> <p>₹180</p>
--	---	---	--

Figure 11.6: Menu Sorted by Category

**Ahar24**
home menu contact us

Items	Title	Price	Quantity	Total	Remove
	Veg salad	₹280	2	₹560	x

**Cart Totals**

Subtotal	₹560
Delivery Fee	₹5
<b>Total</b>	<b>₹565</b>

[PROCEED TO CHECKOUT](#)

If you have a promo code, Enter it here

Submit

**COMPANY**

Home  
About us  
Privacy policy

**GET IN TOUCH**

+8801744820559  
syed.bayes@gmail.com

Figure 11.7: Cart Page

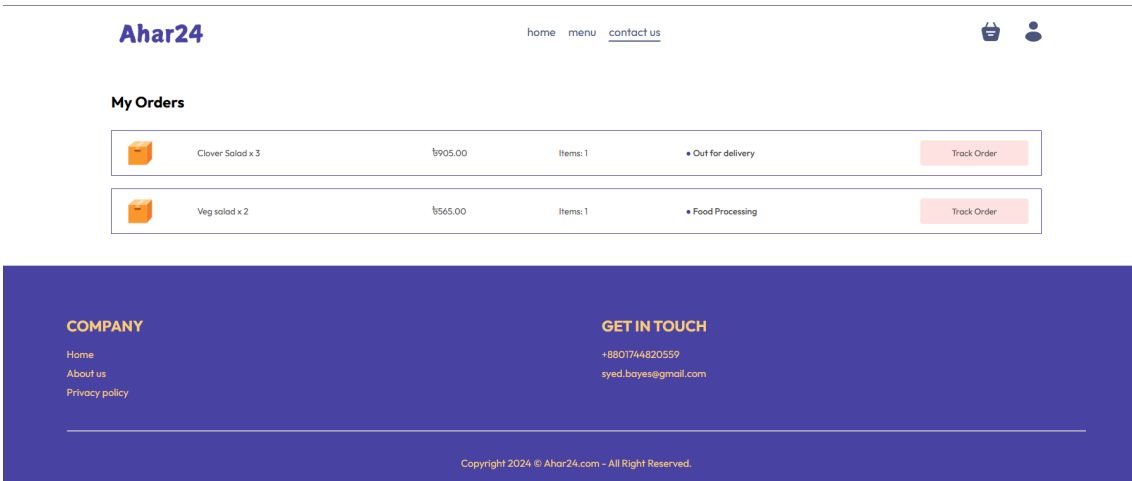


Figure 11.8: Order Page

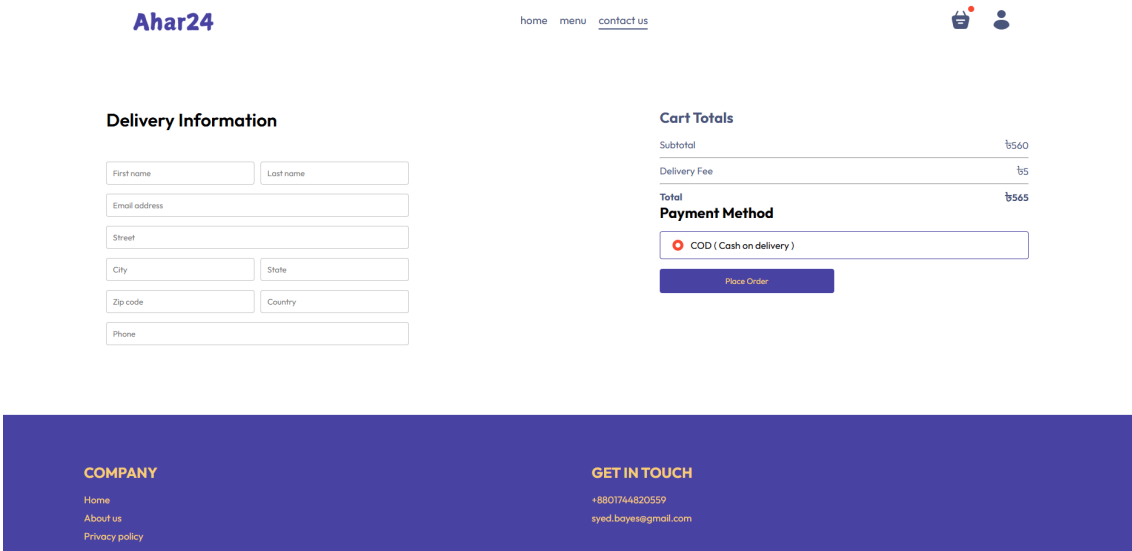


Figure 11.9: Checkout Page



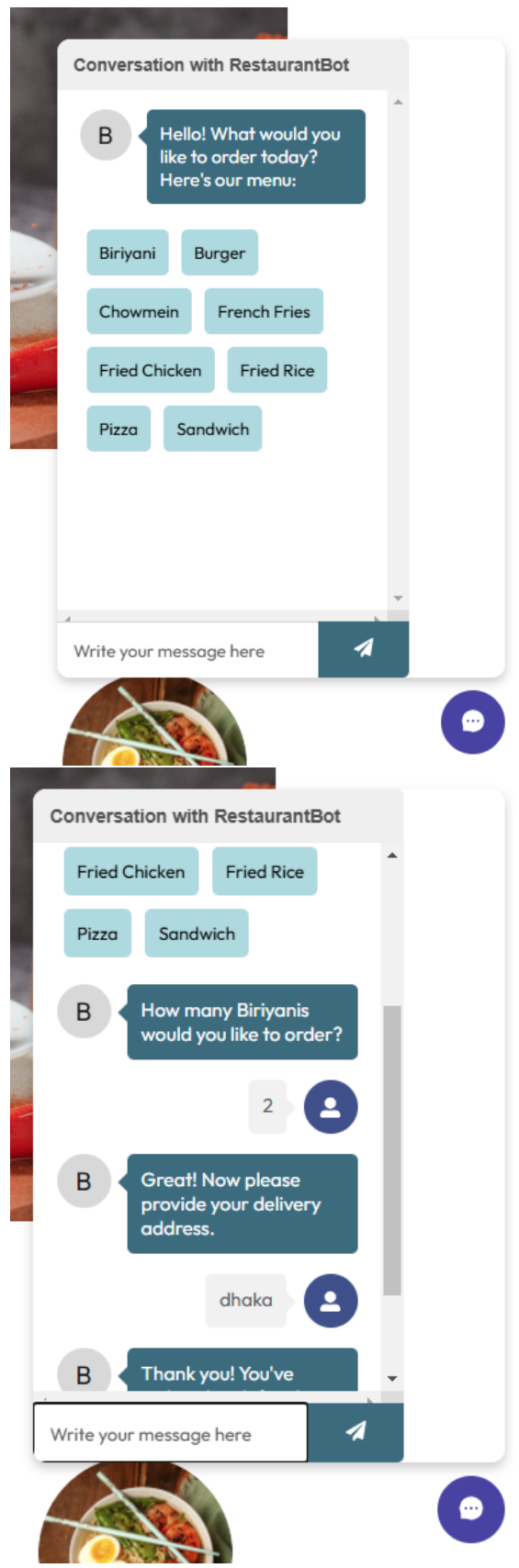
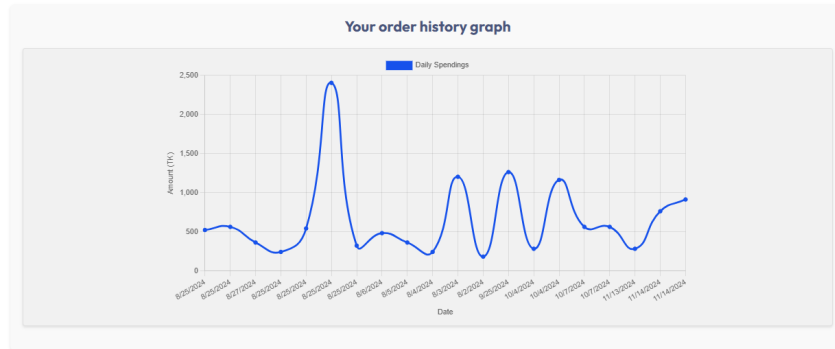


Figure 11.10: Chatbot



**COMPANY**  
Home  
About us  
Privacy policy

**GET IN TOUCH**  
+8801744820559  
syed.boyes@gmail.com

Figure 11.11: Customer Statistics

Add Items

List Items

Orders

Data

Upload image

Product name

Product description

Product category:  Product Price:

Figure 11.12: Adding Menu From Admin Panel

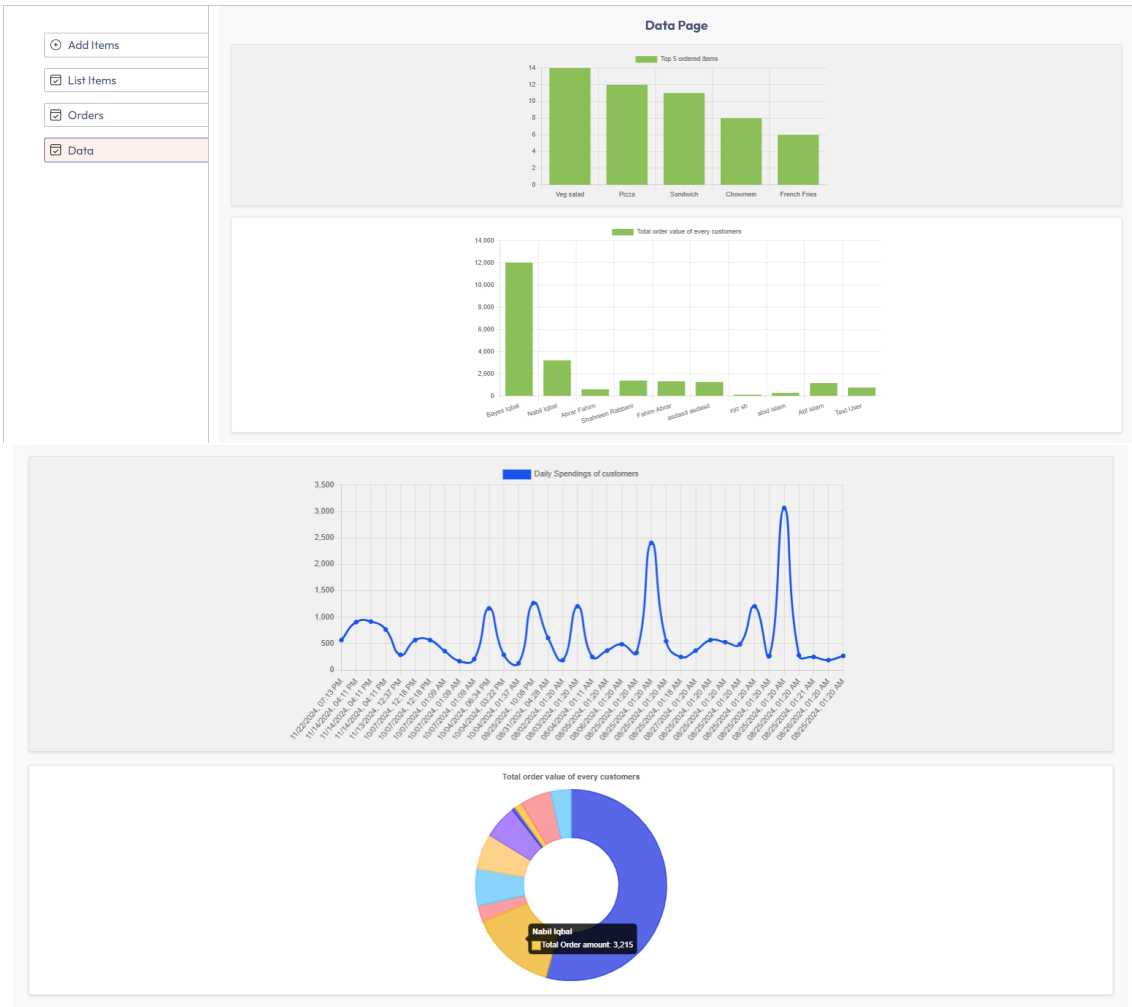


Figure 11.13: Data Page Admin Panel

**All Foods List**

Image	Name	Category	Price	Action
	Greek salad	Salad	₹350	x
	Veg salad	Salad	₹280	x
	Clover Salad	Salad	₹300	x
	Chicken Salad	Salad	₹180	x
	Lasagna Rolls	Rolls	₹120	x
	Puri Puri Rolls	Rolls	₹200	x
	Chicken Rolls	Rolls	₹180	x
	Veg Rolls	Rolls	₹80	x
	Ripple Ice Cream	Deserts	₹160	x
	Fruit Ice Cream	Deserts	₹200	x
	Jar Ice Cream	Deserts	₹220	x

Figure 11.14: Menu List Admin Panel

The screenshot shows the 'Order Page' admin panel. On the left is a sidebar with navigation options: 'Add Items', 'List Items', 'Orders' (highlighted), and 'Data'. The main area displays a list of four orders, each with an orange box icon, item details, quantity, price, and a status dropdown menu.

Item Name	Items	Price	Status
Veg salad x 2 Bayes Iqbal Wireless, Dhaka, Dhaka, Bangladesh, 1200 01744820559	1	৳565	Food Processing
Clover Salad x 3 Bayes Iqbal Wireless, Dhaka, Dhaka, Bangladesh, 1200 01744820559	1	৳905	Out for delivery
Greek salad x 1, Veg salad x 2 Bayes Iqbal Wireless, Dhaka, Dhaka, Bangladesh, 1200 01744820559	2	৳915	Out for delivery
Peri Peri Rolls x 2, Chicken Rolls x 2 Test User Wireless, Dhaka, Dhaka, Bangladesh, 1200	2	৳765	Out for delivery

Figure 11.15: Order Page Admin Panel

The screenshot shows a dropdown menu for food status. The menu is open, displaying four options: 'Food Processing' (selected), 'Food Processing', 'Out for delivery', and 'Delivered'. The selected option is highlighted in blue.

- Food Processing
- Food Processing
- Out for delivery
- Delivered

Figure 11.16: Food Status List Admin Panel

## Privacy Policy

Last Updated: 15th October, 2024

Ahar24 ("we," "us," or "our") is committed to protecting your privacy. This Privacy Policy explains how we collect, use, and share your personal information when you use our website, or any services offered by Ahar24. By accessing or using our services, you agree to this policy.

### 1. Information We Collect

We collect various types of information to provide and improve our services. The types of information we collect include:

**Personal Information:**

Name, email address, phone number, delivery address, and payment details when you register or place an order.

**Usage Data:**

Information about your interactions with our website, including IP address, browser type, and operating system.

**Cookies:**

We use cookies and similar tracking technologies to enhance user experience and monitor website usage.

### 2. How We Use Your Information

We use the information we collect for the following purposes:

---

#### 2. How We Use Your Information

We use the information we collect for the following purposes:

- To process and deliver your food orders.
- To communicate with you regarding orders, promotions, and updates.
- To improve our services and website.
- To provide customer support and handle complaints or inquiries.
- To detect and prevent fraud or unauthorized activity.

#### Data Security

We take reasonable steps to protect your personal information from unauthorized access, use, or disclosure. However, no method of transmission over the internet is 100% secure. We encourage you to protect your account by using strong passwords and limiting access to your devices.

#### COMPANY

[Home](#)  
[About us](#)  
[Privacy policy](#)

#### GET IN TOUCH

+8801744820559  
[syed.bayes@gmail.com](mailto:syed.bayes@gmail.com)

Figure 11.17: Privacy Policy

### About Us

Ahar24 is your go-to solution for satisfying cravings at any time of the day. We are a modern food delivery platform designed to bring delicious meals from your favorite local restaurants straight to your door. Powered by cutting-edge technology, Ahar24 offers a seamless and user-friendly experience, allowing you to browse, order, and enjoy fresh food with just a few clicks. Our mission is simple: to connect people with great food whenever needed. Whether it's breakfast, lunch, dinner, or a midnight snack, Ahar24 ensures that your meals are delivered quickly and reliably, 24/7. At Ahar24, we value quality, convenience, and customer satisfaction. From selecting diverse menu options to ensuring a smooth checkout and secure payment process, we are committed to making food delivery easier and more enjoyable for everyone.

#### COMPANY

[Home](#)  
[About us](#)  
[Privacy policy](#)

#### GET IN TOUCH

+8801744820559  
[syed.bayes@gmail.com](mailto:syed.bayes@gmail.com)

Copyright 2024 © Ahar24.com - All Right Reserved.

Figure 11.18: About Us

#### COMPANY

[Home](#)  
[About us](#)  
[Privacy policy](#)

#### GET IN TOUCH

+8801744820559  
[syed.bayes@gmail.com](mailto:syed.bayes@gmail.com)

Copyright 2024 © Ahar24.com - All Right Reserved.

Figure 11.19: Contact Us