Arab Academy for Science,
Technology & Maritime
Transport

Faculty of Computers and Information Technology

Introduction To Software Engineering

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On Cloud Nine

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1. Project Scope

On Cloud Nine is a campus meal ordering and delivery system that works exclusively with integrated college portals, ensuring a seamless and secure experience for students by automating access and simplifying food services.

2. Problem Definition

Before On Cloud Nine, students faced several issues with campus meal services, including inefficiencies, high costs, and inconvenience. Below are the key challenges:

1. **Space limitations**

    - Limited seating causes congestion and a noisy environment.
    - Students often must stand or find alternative spots to eat, impacting their comfort.

2. **Order Delays & scheduling**

    - Long waiting times cause students to miss classes or rush their meals.
    - Existing services do not provide enough scheduling options, leading to last-minute orders.

3. **Smart Order Recommendations**

    - Students struggle to choose meals efficiently.

4. **High Prices & Limited Offers**

    - Meal costs can be expensive, especially for students on tight budgets.
    - Discounts and offers are rarely available.

5. **Payment Method Constraints**

    - The on-campus cafeteria often requires exact change or only accepts cash.
    - Students without cash in hand face longer waiting times or the inconvenience of finding ATMs.

6. **Automated Nutritional Insights**

    - Students lack visibility in their daily nutritional intake.

7. **Allergies & Dietary Restrictions**

    - Students with allergies find it exhausting to re-specify their needs each time.
    - Menus often do not highlight allergen information clearly.

8. **Lack of Feedback**

    - Cafeterias do not systematically collect feedback to improve menu items or services.
    - Students have no central platform to rate orders or share suggestions, reducing iterative service improvements.

9. **AI-Driven Meal Preparation Time Optimization**

    - Food preparation efficiency is inconsistent.

3. Proposed Solution

On Cloud Nine solves key campus dining challenges with technology, smart logistics, and user-friendly features. Below is an overview of the main problems, solutions, and features that enhance the dining experience.

Key Problems, Solutions, and Features

1. **Space Limitations**

    - **Problem:** Overcrowded on-campus dining areas affect student comfort.
    - **Solution:** Use a pre-order system with scheduled pick-up times.

2. **Order Delays & Scheduling**

    - **Problem:** Students often miss classes or face cancellation due to long waiting times.
    - **Solution:** Advanced scheduling and real-time delivery tracking help ensure meals are ready at convenient times.
    - **Relevant Features:**
        - **Advanced Scheduling & Reminders** (lets users pick specific times or set recurring orders).
        - **Real-Time Delivery Tracking** (tracks order location and offers automated discounts if late).

3. **Smart Order Recommendations**

    - **Problem:** Students struggle to choose meals efficiently.
    - **Solution:** A recommendation system that suggests meals based on previous orders, nutritional preferences, and dietary restrictions.

4. **High Prices & Limited Offers**

- **Problem:** Prices are expensive.
- **Solution:** Offer tiered discounts (loyalty points, GPA-based vouchers), alongside promotional deals to maintain competitive pricing.
- **Relevant Features:**
    - **Rewards & Offers** (Encourage frequent ordering, discount coupons, loyalty programs and achievement-based rewards).

5. **Payment Method Constraints**

- **Problem:** Limited to cash payments, causing inconvenience and exact-change issues.
- **Solution:** Support multiple digital payment methods (Instapay, credit cards, in-app wallet), including partial payments and direct balance refunds.
- **Relevant Features:**
    - **Flexible Payment Options** (supports digital transactions and partial payments).
    - **Balance Wallet** (stores funds and handles refunds).

6. **Automated Nutritional Insights**

- **Problem :** Students lack visibility in their daily nutritional intake.
- **Solution:** An AI-based food analysis tool that estimates calories, macronutrients, and micronutrients based on selected meals.
- **Relevant Features:**
    - **AI-Based Meal Composition Analysis** (analyzes ingredients in selected meals and provides insights into their nutritional value, suggesting healthier alternatives).

7. **Allergies & Dietary Restrictions**

- **Problem:** Students must repeatedly specify allergies, and it's easy to make mistakes.
- **Solution:** A user profile system that stores dietary preferences and allergens, with automatic ingredient alerts and safe menu suggestions.
- **Relevant Features:**
    - **Dietary Profile & Customization** (auto-filters allergens, ensure clarity on ingredients).
    - **View Menu** (includes allergen info to guide user selections).

8. **Lack of Feedback**

- **Problem:** Collect feedback or data analytics on student preferences.
- **Solution:** Provide in-app rating systems, comment sections.
- **Relevant Features:**
    - **Feedback & Ratings** (users can rate meals, submit suggestions).

9. **AI-Driven Meal Preparation Time Optimization**

- **Problem:** Food preparation efficiency is inconsistent.
- **Solution:** A machine learning model that predicts optimal meal preparation times based on historical order volumes and kitchen performance.

4.Requirements

4.1 Functional Requirements

Below is a table of core functions, detailing how different users interact with the system.

ID	Function Name	Description	Actor	Include	Extends
OCN01	Open from portal	Users can access the app through seamless integration with the college portal, but they must first log in through their portal.	User		
OCN02	View Menu	Displays the entire menu, highlighting allergens, nutritional info, and special offers.	User	OCN04	
OCN03	Customize Meal	Lets users add/remove ingredients based on dietary preferences stored in their profile.	User		
OCN04	Set Allergies	The user fills in allergy information, which is then used to filter out unsafe menu items.	User		
OCN05	Add to Cart	Allow users to place one or more items in their virtual cart before finalizing.	User	OCN03	
OCN06	Confirm Order	Allows users to confirm his orders	User		OCN05
OCN07	Schedule Order	Lets users select delivery/pickup times, set recurring orders, or pre-order for future dates.	User		OCN06
OCN08	Check Balance Wallet	Users can add funds, view balance, and receive change.	User		
OCN09	Order Status	Shows real-time order location and estimated time of arrival.	User	OCN06	OCN23
OCN10	Manage Orders	Allows Kitchen staff to confirm, or cancel orders and assign order to staff and Provides kitchen staff with a dashboard to view incoming orders..	Kitchen Staff	OCN17	
OCN11	View Coupon	Allows users to view and redeem discount offers.	User		
OCN12	View Orders	Allows users to view orders.	User		

OCN13	Cancel Orders	Allows users to cancel order	User	OCN12	
OCN14	Provide Feedback	Let the users rate meals, leave comments, and suggest improvements and report order issues (e.g., missing items, delays).	User		OCN12
OCN15	Manage Menu	Let staff update menu items and prices.	Inventory Manager		
OCN16	Manage Inventory	Lets Inventory Manager update inventory and manage supplier orders.	Inventory Manager		
OCN18	Allergy Alert	Automatically checks customized meals against the user's dietary profile and alerts the user if allergens/restrictions are violated.	System		OCN05
OCN19	Link Attendance & GPA	Our system integrates with student attendance records, allowing us to automate discounts and coupons based on attendance.	System	OCN11	
OCN20	Send Notifications	Sends push or email notifications about upcoming orders, delayed deliveries.	System (Automated)	OCN23	
OCN21	Payment	Processes payments through multiple methods (in-app wallet, Instapay, card) and confirms purchase.	User	OCN06 OCN08 OCN22	OCN11
OCN22	Confirm enough money	Checks whether the user's selected payment method(card) or in-app wallet has sufficient funds.	System (Automated)		
OCN23	Deliver Orders	Responsible for transporting the prepared meal to the user's location, updating the order status as "out for delivery" and "delivered."	Delivery	OCN06	
OCN24	Split Check	Allows a user to divide the order's total cost among multiple payers, supporting partial or shared payments.	User		OCN21

4.2 Non-Functional Requirements

1. **Performance**

    - The app seamlessly supports tens of thousands of concurrent users while maintaining a lightning-fast response time of under 100 milliseconds per transaction.

2. **Reliability**

    - Designed for long-term stable operation with minimal downtime.
    - The system is designed to handle high loads and unexpected issues, ensuring that essential functions like payment processing continue running smoothly.

3. **Security**

    - Use two-factor authentication for secure access to sensitive data like payment info and encrypt user information during transfer and storage.
    - Uses advanced data protection techniques, such as tokenization and end-to-end encryption, to keep user information secure during storage and transmission.

4. **Usability**

    - The app is designed for a smooth and intuitive experience, ensuring quick navigation, clear readability, and effortless interaction for all users.

5. **Scalability**

    - The App can handle a 50% increase in traffic smoothly and can add more servers or services as needed.

6. Portability

- The application will be available on iOS and Android platforms.

7. Maintainability

- The project features clear documentation and a structured version control system to track revisions efficiently.
- Its modular architecture ensures easy updates, rapid bug fixes, and seamless feature expansions.

8. Compatibility

- The app seamlessly integrates with external platforms, including payment systems and campus portals, through flexible and standardized APIs.

Use Case Diagram