

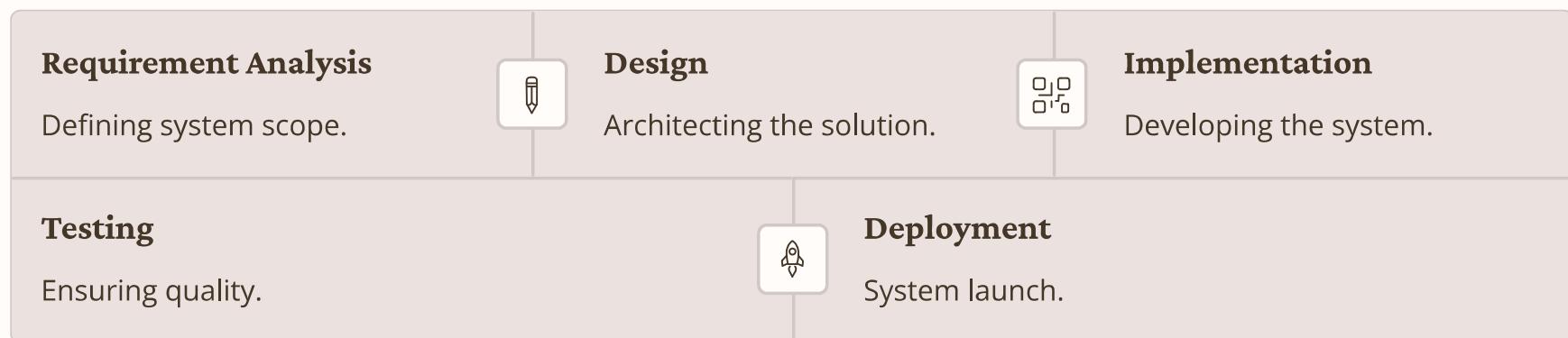
SDLC Implementation for Canteen Food Ordering System

Introduction: The Need for Digital Transformation in Canteen Services

Traditional canteen ordering is fraught with manual processes, leading to errors and significant queuing during peak periods. There is a growing demand for efficient, cashless, and user-friendly ordering systems within institutional canteens. Research highlights the success of adopting structured methodologies, such as the SDLC waterfall model in an Indonesian canteen system, to minimise operational errors and elevate service delivery.

Our primary objective is to develop a robust, web-based system designed to streamline the entire ordering and payment process. This initiative aims to significantly improve the experience for both canteen tenants and customers, ushering in an era of digital efficiency.

Overview of the Software Development Life Cycle (SDLC) in This Project



The Software Development Life Cycle (SDLC) provides a structured framework crucial for developing high-quality software within stipulated timelines. For this project, the Waterfall model was selected due to its sequential, phase-by-phase progression, which includes meticulous requirement analysis, comprehensive design, precise implementation, rigorous testing, and seamless deployment.

This methodical approach offers several benefits, including reduced errors, enhanced communication among stakeholders, and the establishment of clear, measurable milestones. Such an approach has proven effective in similar projects, such as online food ordering system developments in other regions.

Requirement Gathering and Analysis

Key Stakeholders

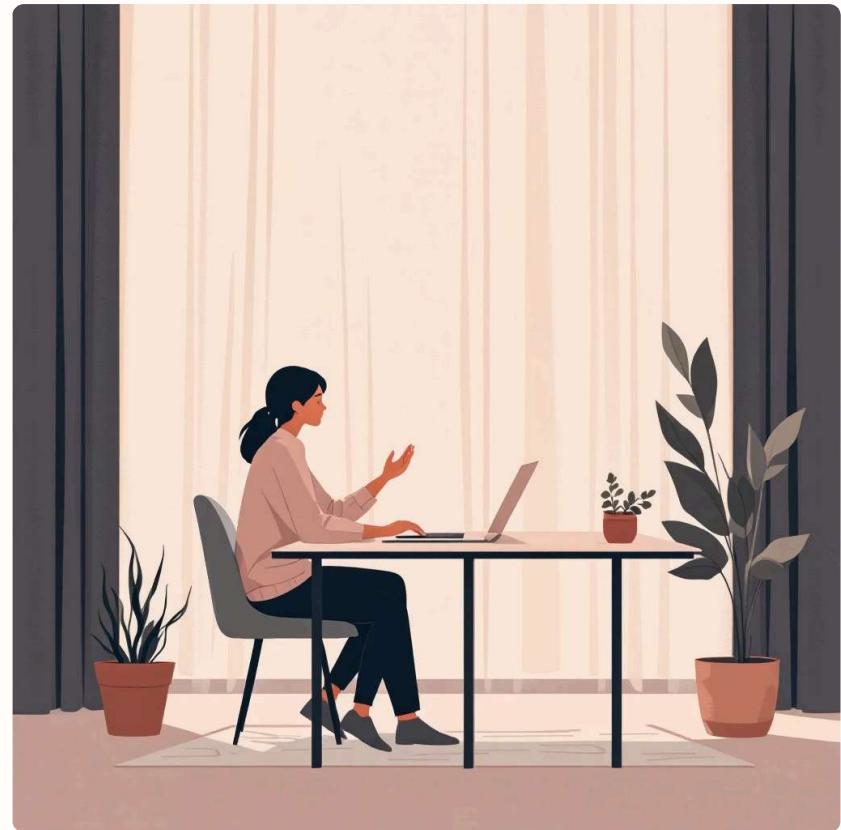
- Canteen Tenants
- Customers
- Administrators

Functional Requirements

- Menu browsing
- Order placement
- Payment processing (UPI/e-wallet)
- Order tracking

Non-Functional Requirements

- Usability
- Security
- Scalability



The initial phase involved extensive requirement gathering and analysis, crucial for understanding the system's scope and functionalities. We engaged key stakeholders, including canteen tenants, customers, and administrators, through interviews, surveys, and direct observation of existing manual ordering processes.

This comprehensive analysis allowed us to define both functional requirements, such as intuitive menu browsing, seamless order placement, and diverse cashless payment options, as well as critical non-functional requirements encompassing usability, robust security, and the system's ability to scale efficiently during peak operational hours.

System Design and Architecture

1

User Interface (UI) Design

Focus on intuitive navigation and responsive layout for optimal user experience across devices.

2

Backend Database

Structured schema for menus, orders, user profiles, and payment transaction records, ensuring data integrity.

3

UML Modelling

Use case, sequence, and activity diagrams were employed to visually represent system behaviour and interactions.

4

Technology Stack

Utilising HTML, CSS, and PHP for development, with SQL for robust database management.

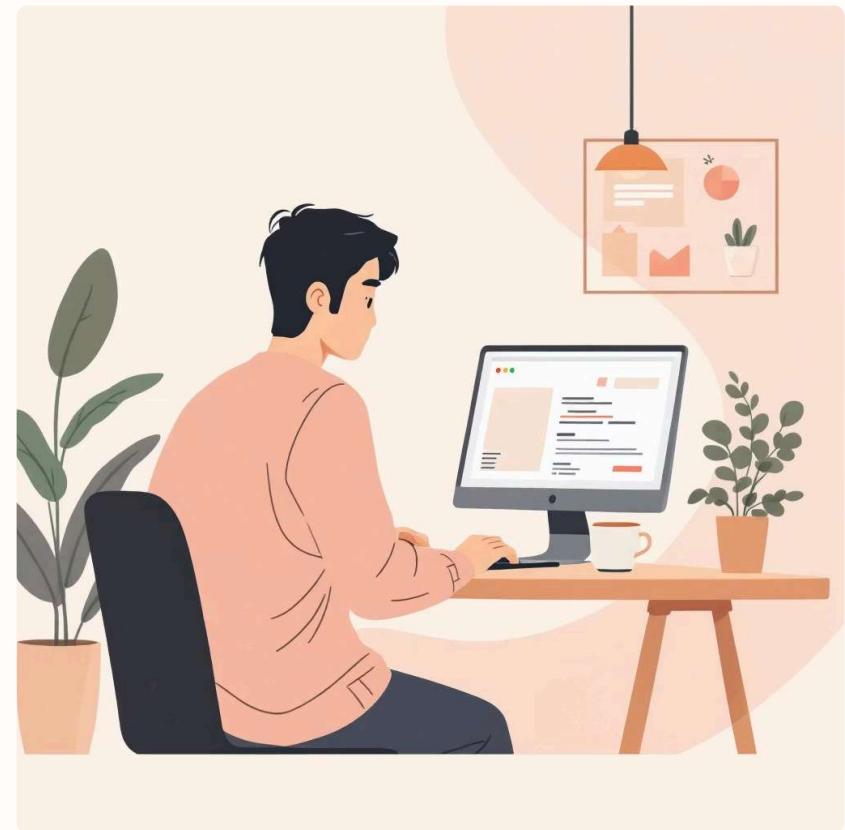
The system design phase concentrated on creating a highly functional and user-friendly web interface, ensuring clear navigation for menu selection and real-time order tracking. A robust backend architecture was meticulously designed, featuring a comprehensive database schema to manage menu items, customer orders, user profiles, and all payment records effectively.

Unified Modeling Language (UML) diagrams, including use case, sequence, and activity diagrams, were extensively employed to model the system's dynamic behaviour and interactions. The chosen technology stack comprises HTML for structure, CSS for styling, PHP for backend logic, and SQL for efficient database management, aligning with industry best practices.

Website Coding and Implementation

The coding and implementation phase focused on translating the design specifications into a tangible, functional system. Frontend development prioritised a responsive design, ensuring optimal viewing and interaction across various devices, from desktops to mobile phones. This adaptability guarantees a seamless user experience regardless of the access point.

Backend coding was meticulously executed to manage complex processes such as order handling, secure payment integration, and real-time updates to ensure all information is current and accurate. A critical aspect of this phase was the integration of diverse payment gateways, supporting a range of cashless transactions to minimise queues and prevent common ordering errors. Furthermore, innovative features like an integrated chatbot were implemented to provide instant support and enhance user engagement, drawing inspiration from successful university projects.



Testing Phase: Ensuring Reliability and Usability

01

Unit Testing

Individual components rigorously checked for functionality.

02

Integration Testing

Ensuring seamless interaction between system modules.

03

System Testing

Comprehensive evaluation of the entire system's compliance with specified requirements.

04

User Acceptance Testing (UAT)

Final validation by end-users to confirm system meets operational needs.

The testing phase was critical to validating the system's reliability and usability. Various testing methodologies were employed, including unit testing for individual components, integration testing to ensure seamless module interaction, system testing for overall functionality, and user acceptance testing (UAT) involving actual users.

The results from these tests demonstrated that the system is intuitive, significantly reduces order errors, and dramatically speeds up payment processing. User feedback was overwhelmingly positive, with 70% rating usability highly, and the chatbot feature achieving a 100% positive response for its ease of use. This iterative testing approach proved invaluable in identifying and rectifying bugs early, thereby enhancing the overall user experience.

Deployment and Implementation Challenges

Deployment Considerations

- Secure institutional server hosting
- Data privacy compliance
- Network infrastructure stability

Training & Adoption

- Comprehensive staff training
- User onboarding programs

Challenges Encountered

- Resistance to change
- Initial technical glitches
- Ensuring network reliability



Deployment involved installing the system on institutional servers, necessitating careful consideration of security protocols and data privacy. A significant aspect was training canteen staff and end-users to facilitate a smooth transition to the new digital platform. Challenges encountered included initial resistance to change from some users, minor technical glitches during the initial rollout, and ensuring consistent network reliability.

To mitigate these issues, a phased rollout strategy was implemented, coupled with continuous technical support and an active feedback mechanism to address concerns promptly. These measures were crucial in overcoming adoption hurdles and ensuring the system's successful integration into daily operations.

Benefits and Impact of the Implemented System

1

Reduced Queue Times

Significantly shortened waiting periods and fewer manual errors.

2

Enhanced Customer Satisfaction

Easy access to menus and diverse payment options.

3

Improved Operational Efficiency

Real-time order management for canteen tenants.

4

Environmental Benefits

Reduced paper consumption through digital ordering.

The implemented canteen food ordering system has delivered substantial benefits, fundamentally transforming daily operations. There has been a marked reduction in queue times and a significant decrease in manual errors related to order and payment processing, enhancing overall efficiency.

Customer satisfaction has notably improved due to convenient menu access and the availability of multiple cashless payment options. For canteen tenants, operational efficiency has soared with real-time order management capabilities, streamlining their workflow. Additionally, the system contributes to environmental sustainability by reducing paper usage, replacing traditional manual order slips with a digital solution.

Conclusion and Future Directions

The development of the canteen food ordering system, guided by a robust SDLC framework, has resulted in a resilient and user-centric solution. This project unequivocally demonstrates how structured software engineering practices can effectively resolve real-world operational challenges, particularly within institutional settings.

Looking ahead, future enhancements will focus on integrating a dedicated mobile application, implementing AI-powered recommendation systems for personalised ordering, and expanding the range of cashless payment options to further diversify user convenience. We strongly advocate for institutions to embrace such digital transformations to modernise their food service operations and ensure heightened satisfaction for all stakeholders.