

Web-Based Multi-Cafe Information System in the West Jakarta Area

Luthfia Fauzia Dewi Ariyanti^{1*}, Janu Ilham Saputro², Eduard Hotman Purba³, Muhammad Nur Habibie⁴
^{1, 2, 3, 4, 5} Information System, Universitas Raharja, Indonesia

*Corresponding Author: fiafauzia@raharja.info

Abstract - Evolving urban lifestyles have driven increased public interest—particularly in West Jakarta—in visiting cafes for relaxation, work, and socializing. However, information regarding cafe locations, menus, prices, facilities, and operating hours remains fragmented and difficult to access centrally, making it challenging for potential customers to make informed choices. This research aims to design and develop a web-based information system that integrates data from various cafes in West Jakarta into a single, unified platform. The system development follows the Waterfall model, encompassing requirements analysis, system design, implementation, testing, and maintenance. The system was built using web-based programming languages and a relational database to store cafe information, incorporating features such as search functionality, location- and category-based filtering, and user reviews. System testing utilized the Black Box Testing method to ensure all functions operated according to requirements, alongside usability testing to assess the system's ease of use for end-users. The results indicate that this multi-cafe information system enables users to quickly and accurately search for and compare cafe information while simultaneously assisting cafe owners in digitally promoting their businesses. This system is expected to serve as a beneficial, unified information solution for both the public and cafe business owners in West Jakarta.

Keywords:

Information System;

Café;

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INTRODUCTION

Shifts in urban lifestyles over the past decade have altered consumption patterns, particularly regarding leisure, work, and socializing outside the home. Cafés are no longer merely venues for enjoying coffee or snacks; they have transformed into multifunctional spaces that facilitate productivity, social interaction, and even informal business activities [1]. This phenomenon is particularly evident in densely populated urban areas like West Jakarta, which has seen a significant rise in the number of cafés driven by growing public interest in "coffee culture" as an integral part of modern living [2].

While this rapid expansion of cafés offers promising business opportunities for culinary MSMEs, it simultaneously presents a challenge for potential customers trying to make a choice. Information regarding locations, menus, price ranges, facilities, operating hours, and café atmospheres remains scattered across various non-integrated platforms—such as social media, mapping apps, and independent review sites. This situation compels prospective customers to seek information from multiple sources simultaneously, often resulting in data that is inconsistent, outdated, or even inaccurate [3].

On the other hand, digitalization has proven to be one of the most effective strategies for helping small and medium-sized enterprises (SMEs)—including cafés—enhance their visibility and competitiveness [4]. Unfortunately, not all café owners in West Jakarta possess the resources, time, or technical expertise to independently establish and manage digital promotional channels. Many small-to-medium-scale cafés still rely on word-of-mouth promotion or social media posts that are ephemeral and difficult for new prospective

customers to locate later. Consequently, a gap exists between the public's need for centralized, accurate café information and the ability of business owners to consistently provide such information.

This issue highlights the need for an information system capable of integrating data from various cafes into a single platform that is easily accessible to the general public. A web-based information system was selected as the solution due to its accessibility—anytime and anywhere via internet-connected devices—without requiring the additional installation processes associated with mobile applications [5]. Furthermore, a web-based system enables centralized data management, ensuring that information updates made by cafe owners are immediately reflected and accessible to users in real-time.

Several previous studies have addressed the development of web-based information systems for the tourism and culinary sectors. Research by Hidayat et al. [6] involved the development of a web-based culinary tourism information system featuring search and location-filtering capabilities; this system was shown to improve user information search efficiency by over 60%. Meanwhile, a study by Aryanto and Fadillah [7] emphasized the importance of employing structured system development methods—such as the Waterfall model—when building information systems that require clear requirement workflows and minimal specification changes during the development process. That research serves as the basis for selecting the development method used in this study.

Based on the issues and the review of prior research mentioned above, this study aims to design and build a web-based multi-café information system for the West Jakarta area that integrates data from various cafés into a single, centralized platform. The system is designed to make it easier for the public to search for, compare, and select cafés according to their preferences, while also providing café owners with a space to digitally promote their businesses without needing to build their own platforms.

Based on the background outlined above, the research problem focuses on designing and developing a web-based information system capable of centrally integrating data on cafés in West Jakarta, ensuring accuracy and ease of user access. This research aims to design, build, and test a web-based information system that presents information on multiple cafés in West Jakarta—including locations, menus, prices, facilities, and user reviews—thereby making it easier for the public to choose a café while assisting café operators with digital promotion. From a practical standpoint, this research is expected to facilitate access to comprehensive and reliable café information for the residents of West Jakarta and help café owners increase their business visibility. From an academic perspective, the research is expected to serve as a reference for the development of similar information systems in other regions or business sectors.

LITERATURE REVIEW

Several previous studies have addressed topics relevant to the development of web-based information systems in the culinary and MSME sectors, which served as the basis for this research.

Research conducted by Hidayat, Anggraini, and Saputra [6] developed a web-based culinary tourism information system with a digital map-based search and location filter feature. The results showed that the integration of the location-based search feature increased user efficiency in finding culinary establishments by over 60% compared to manual searches via social media. This research served as the primary reference in designing the search and filter features in the developed system.

Aryanto and Fadillah [7] examined the application of the Waterfall system development method to the development of a web-based MSME information system. The study concluded that the Waterfall model is suitable for projects with clearly defined system requirements from the outset, due to its straightforward development flow sequential [approach] facilitates the processes of documentation and incremental testing.

Kurniawan and Aditya [5] conducted a comparative study between web-based information systems and mobile applications for the small business sector. The results indicate that web-based systems are superior in terms of cross-device accessibility and the ease of centralized data updates, eliminating the need for users to download or update the application.

Nugroho, Setiawan, and Lestari [4] examined the impact of digitalization on increasing the visibility of culinary MSMEs in urban areas. The study found that MSMEs with centralized digital information channels experienced a significant increase in the number of new visitors compared to those relying solely on conventional promotion.

Wulandari and Santosa [3] examined the issue of information fragmentation across culinary review platforms distributed among various applications. Their study recommended the implementation of an information aggregation system to centralize data from multiple sources onto a single platform, thereby enhancing information accuracy and consistency for users.

Ramadhani, Wibowo, and Putri [2] investigated consumer behavior regarding café selection in densely populated urban areas, identifying location, price, and the availability of information on facilities as key considerations prior to visiting. These findings informed the selection of information attributes displayed in the system developed for the current study.

Fitriani and Rahmawan [8] conducted usability testing on a web-based business directory information system using the System Usability Scale (SUS) method. The results yielded an SUS score exceeding 70—indicating a good level of usability—and served as the reference for the usability testing methodology employed in this study.

Saputra and Handoko [9] examined the effectiveness of the Black Box Testing method in validating the functionality of web-based information systems prior to the implementation phase. Their research demonstrated that Black Box testing is effective at detecting functional errors without requiring in-depth knowledge of the program code structure, making it suitable for the final testing stage of system development.

Based on the review of prior research above, it can be concluded that developing web-based information systems using the Waterfall method—incorporating search and filter features and validated through Black Box and usability testing—has proven effective across various business contexts. However, there is a scarcity of research specifically integrating data from multiple cafés into a single centralized platform within the West Jakarta area; this study addresses that research gap.

METHODOLOGY

Research Type

This study uses a Research and Development (R&D) approach, a research method used to produce a particular product and to test its effectiveness. The product produced in this study is a web-based information system that integrates multi-café data in the West Jakarta area. This approach was chosen because the research does not stop at the needs-analysis stage but continues through the design, implementation, and testing stages, in line with similar studies that developed web-based information systems for the MSME and culinary sectors [10], [11].

Research Location and Time

The research was conducted on cafés located in the West Jakarta area, covering several sub-districts with a high concentration of café businesses. Data collection was carried out through field observation, interviews with café owners, and questionnaires distributed to prospective system users. The research was conducted over a period of six months, from the needs-analysis stage through the system-testing stage.

Data Collection Methods

The data collection methods used in this study consist of three techniques, namely:

- Observation, conducted by directly visiting several cafés in the West Jakarta area to observe facility conditions, menus, prices, and operating hours as material for the system's data-needs analysis, in line with the field-observation-based culinary-business location-mapping approach used by Asdaningsih et al. [12].
- Interviews, conducted with café owners or managers to explore digital-promotion feature needs that had not yet been met, referring to findings that many culinary MSME actors have not yet optimally utilized digital platforms [11].
- Literature Study, conducted by reviewing journals, books, and technical documentation related to the development of web-based information systems, the Waterfall method, Black Box testing, and usability testing as the theoretical basis of the research.

System Development Method

System development in this study uses the Waterfall model, a software development method that is sequential and linear, in which each stage must be completed before proceeding to the next stage. This model was chosen because the system requirements in this study had been clearly defined from the outset, making it consistent with the characteristics of the Waterfall model, which is suitable for projects with stable specifications and minimal changes during the development process [10], [13]. The stages of the Waterfall model used are as follows:

- a. Requirement Analysis
This stage is carried out to identify the system's functional and non-functional requirements, including café data (name, location, menu, prices, facilities, operating hours), search and filter features, user review features, and admin-panel requirements for café owners to manage their business data.
- b. System Design
This stage translates the results of the requirements analysis into a system design, including the design of Use Case Diagrams, Activity Diagrams, Entity Relationship Diagrams (ERD), and the system interface design. The relational database structure is designed to store café, user, and review data in a structured and efficient manner.
- c. Implementation (Coding)
This stage is the process of translating the design results into program code using a web-based programming language (PHP) with a particular framework, along with a MySQL database as the data storage medium.
- d. Testing
The system that has been built is tested to ensure that all functions run according to requirements using the Black Box Testing method, and its ease of use is tested using the usability testing method based on the System Usability Scale (SUS).
- e. Maintenance

This stage is carried out after the system has been implemented, covering bug fixes, café data updates, and feature adjustments based on user feedback after implementation.

The flow of the Waterfall model stages in this study is illustrated in Figure 3.1.

(Figure 3.1. Waterfall Model Stages: Requirement Analysis → System Design → Implementation → Testing → Maintenance)

System Requirements Analysis

Functional Requirements

The system to be built must be able to:

- Display a list of cafés along with information on location, menu, prices, facilities, and operating hours.
- Provide a search and filter feature for cafés based on location, category, and price range.
- Provide a review and rating feature from users.
- Provide an admin panel for café owners to add, edit, and delete their own café data.
- Provide a map-based search feature to visually display café locations, referring to the web-based café location search approach applied by Tukino [14].

Non-Functional Requirements

- The system can be accessed through various devices (responsive web design).
- The system has a fast response time in displaying data.
- The system has an adequate level of user data security.
- The system is easy to use (usable) for users with varying levels of digital literacy.

System Design

System design includes the creation of a Use Case Diagram that describes the interaction between actors (visitors, café owners, and admins) and the system, an Activity Diagram that describes the flow of the café search and data-management processes, and an Entity Relationship Diagram (ERD) that describes the relationships between data entities such as cafés, menus, users, and reviews. This relational database design refers to the structured data-storage approach commonly used in web-based MSME information systems [10].

System Testing Methods

Black Box Testing

Functional testing of the system is carried out using the Black Box Testing method, a testing method that focuses on evaluating the system's output based on specific inputs, without considering the internal structure of the program code. This method is used to ensure that each feature, such as search, filter, admin login, and café data management, functions according to the established requirements [13], [15].

Usability Testing (System Usability Scale)

In addition to functional testing, the system's ease of use is also tested using the System Usability Scale (SUS) method, a usability-testing instrument consisting of 10 Likert-scale statements, the results of which are converted into a score of 0–100 to assess the level of ease of use of the system by end users [16]. This test involves a number of respondents representing prospective system users, namely the general public as café information seekers and café owners as data managers.

RESULTS AND DISCUSSION

1. Unified Modeling Language (UML)

Actor Identification

Table 1. Actor Description

Actor	Description
Customer	User who searches for cafés, and makes bookings and orders.
Cafe Staff	Cafe employee who manages data and orders.
Admin	System administrator responsible for overall system monitoring.

Functional Requirements

Customer Functional Requirements

- View the list of cafés along with their details (location, facilities, photo gallery).
- Book a Table by selecting the date, time, and table number.
- Pre-order menu items (ordering food when booking so it is ready upon arrival).
- Make a down payment or full payment via simulated QRIS.
- View transaction history and booking status.

Cafe Staff Functional Requirements

- Create, Read, Update, Delete (CRUD) food and beverage menu data.
- CRUD operations on the cafe ambiance photo gallery data.
- Accept or reject table booking requests from customers.
- Update order status.

Admin Functional Requirements

- Manage master cafe data (registration of new cafés).
- Manage user data (password reset).
- View combined transaction reports from all cafés.

Non-Functional Requirements

- User password security must be encrypted (hashed). The ID structure uses UUID for data security.
- The system is able to handle simultaneous tasks when multiple users make bookings at the same time (multi-user).
- The system interface is user-friendly.

Use Case Identification

Table 5. Use Case Identification

No.	Use Case	Actor	Description
1	Login	All	User authentication process
2	View Cafe	Customer	View the list and details of cafés
3	Book Table	Customer	Cafe table reservation
4	Order Menu	Customer	Ordering menu items before arrival
5	QRIS Payment	Customer	Payment using simulated QRIS
6	Manage Menu	Cafe Staff	CRUD operations on the cafe menu
7	Process Order	Cafe Staff	Processing customer orders
8	System Monitoring	Admin	Monitoring all system activities

Figure 1. Use Case Diagram

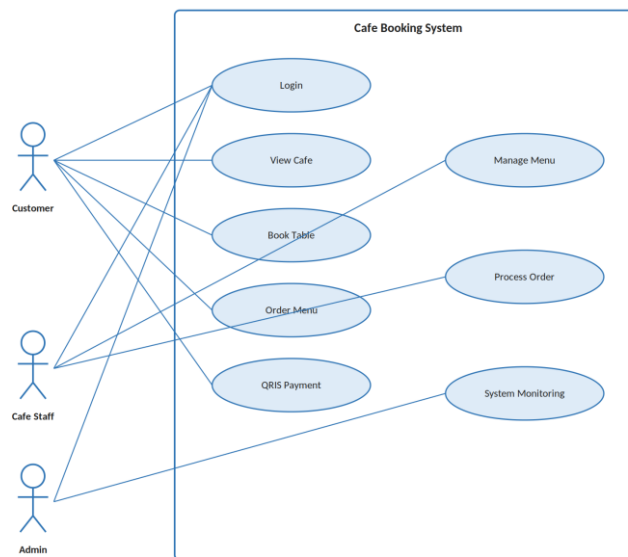


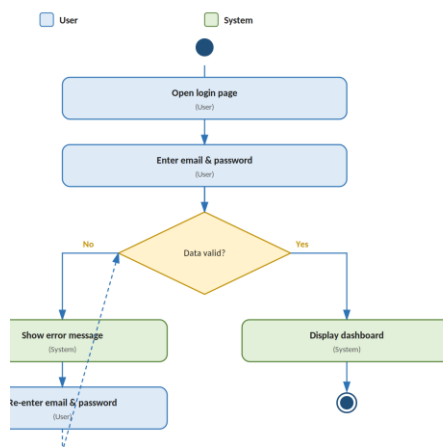
Figure 1. Use Case Diagram

System Diagrams

Registration Activity Diagram

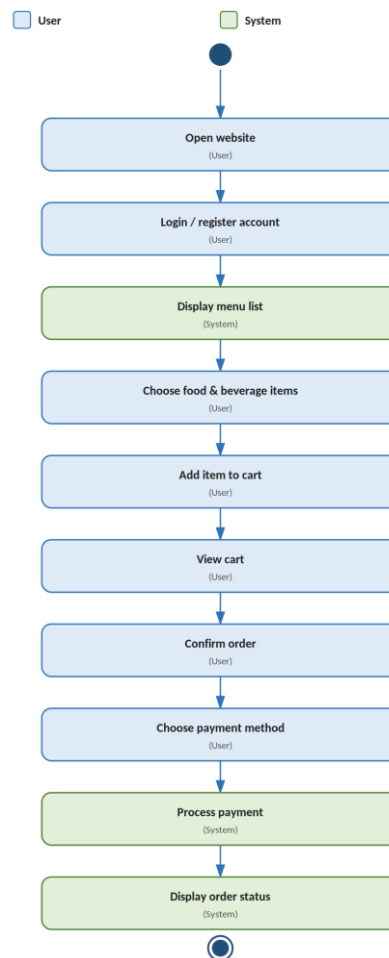
This diagram describes the flow of the new user registration process on the system (referenced in the original chapter but not included as a separate figure).

Figure 2. Login Activity Diagram



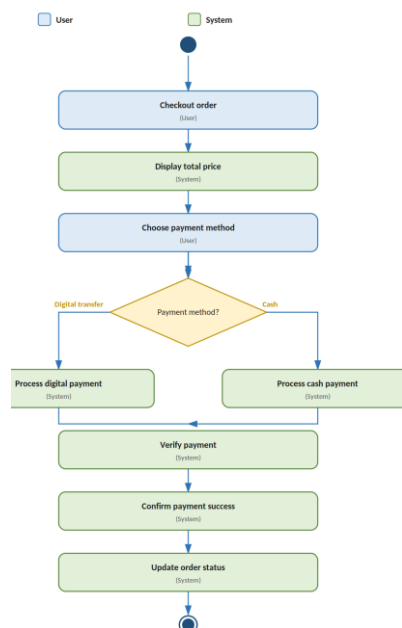
Customer Orders Food Activity Diagram

Figure 3. User Orders Food Activity Diagram



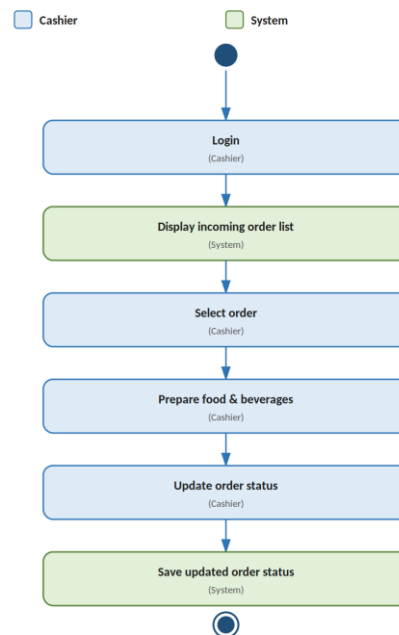
Payment Activity Diagram

Figure 4. Payment Activity Diagram



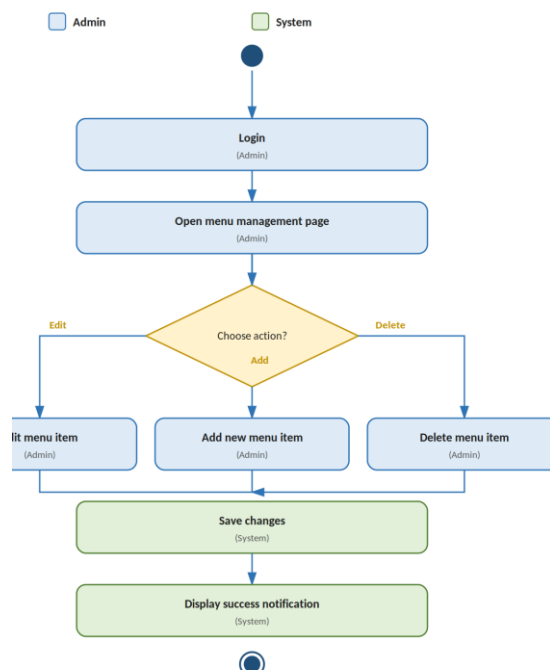
Seller (Cashier) Processes Order Activity Diagram

Figure 5. Cashier Processes Order Activity Diagram



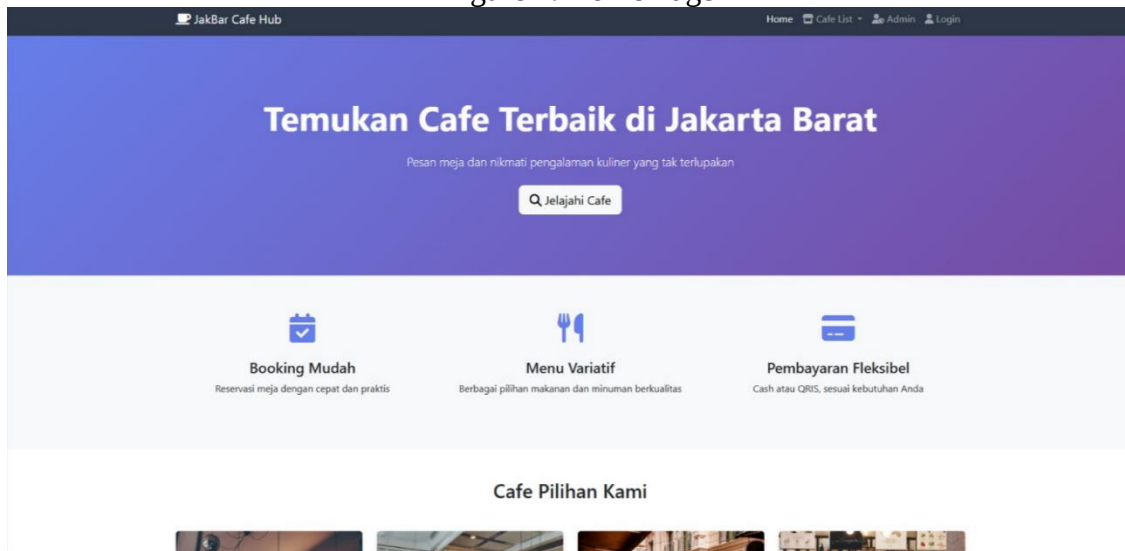
Admin Manages Menu Activity Diagram

Figure 6. Admin Manages Menu Activity Diagram



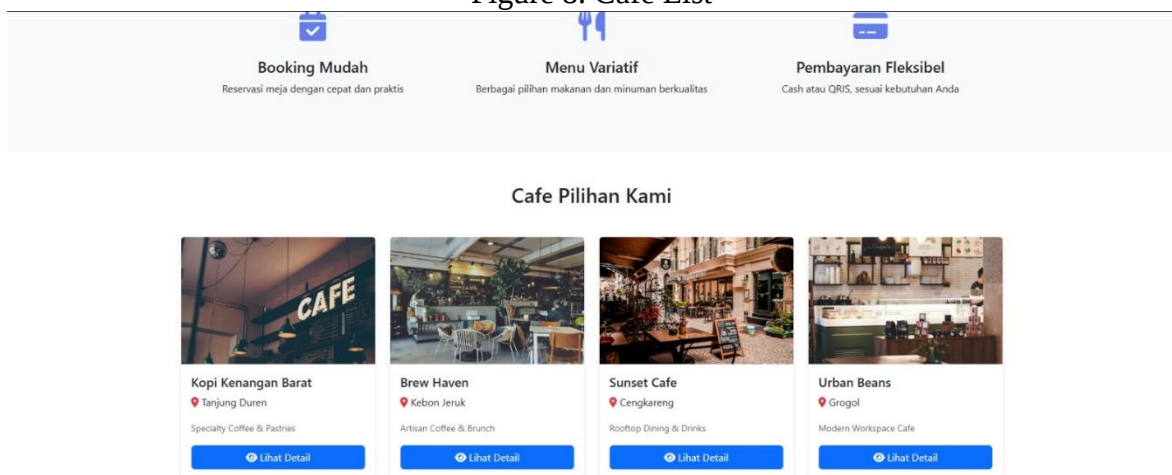
Application implementation

Figure 7. Home Page



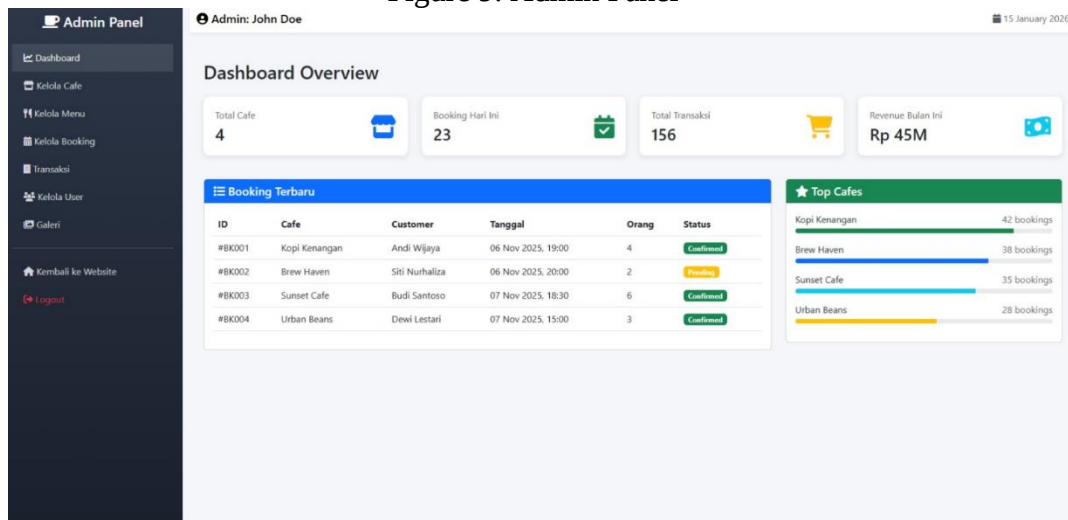
- Displays the main headline "Find the Best Cafe in West Jakarta".
- Equipped with an Explore Cafe button as the main navigation.
- Provides information on key features: Easy Booking, Varied Menu, and Flexible Payment.
- Serves as an introduction of the service to users.

Figure 8. Cafe List



- Displays a list of featured cafes in card form.
- Each card contains a cafe image, name, location, short description, and a **View Details** button.
- Makes it easier for users to select and view the details of the desired cafe.

Figure 9. Admin Panel



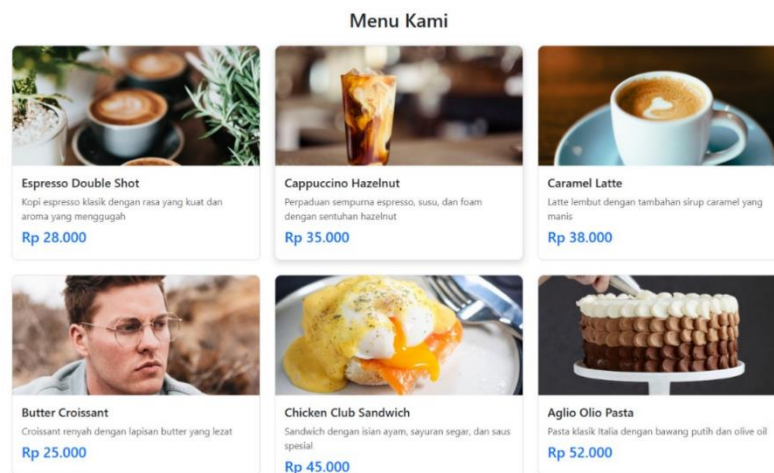
- Used to **manage the cafe system** by the admin.
- Displays a **dashboard overview** such as total cafes, today's bookings, total transactions, and this month's revenue.
- Provides a **recent bookings** table containing customer data, date, number of people, and reservation status.
- There is a navigation menu for managing cafes, menus, bookings, transactions, and users.

Figure 10. Book a Table / Table Reservation

The 'Reservasi Meja' form is designed for customers to make a table reservation. It includes input fields for Name, Email, Phone Number, Date & Time, Number of People, and Table Number (optional). There is also a field for special notes and a prominent 'Reservasi Sekarang' button to submit the reservation.

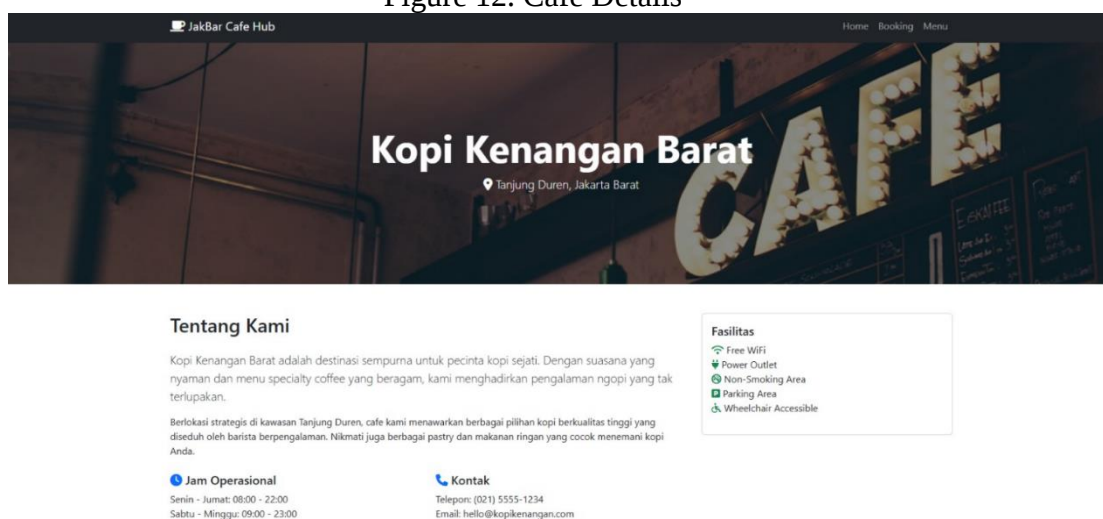
- Used by customers to **make a cafe table reservation**.
- Contains data input fields such as name, email, phone number, date & time, number of people, table number, and special notes.
- The **"Reserve Now"** button to submit the reservation data.

Figure 11. Menu



Displays the list of food and drinks available at the cafe, complete with images, menu names, short descriptions, and prices. This section helps visitors know the menu options before ordering or visiting.

Figure 12. Cafe Details



Presents complete information about the cafe, such as the cafe name, location, short description (about us), operating hours, contact, and available facilities. The goal is for users to fully understand the cafe's profile before making a reservation.

CONCLUSION

Based on the design, development, and testing processes undertaken, it can be concluded that a web-based multi-café information system for the West Jakarta area was successfully developed using the Waterfall methodology—spanning requirements analysis, system design, implementation, testing, and maintenance. The system integrates data from various cafés—including locations, menus, prices, facilities, and operating hours—into a single centralized platform, thereby addressing the issue of information fragmentation

previously scattered across platforms such as social media, mapping applications, and independent review sites.

The developed system offers key features such as café search and filtering based on location, category, and price range; table reservations; menu pre-ordering; QRIS payment simulation; and an admin panel that allows café owners to independently manage menu data, photo galleries, and order statuses. Functional testing using the Black Box Testing method demonstrated that all features—including login, search, filtering, reservations, and café data management—operate according to the established requirements. Meanwhile, usability testing using the System Usability Scale (SUS) method indicated that the system is easy to use for individuals with varying levels of digital literacy.

This system enables prospective customers to search for, compare, and select cafes in West Jakarta quickly, accurately, and efficiently, without the need to access multiple platforms simultaneously. Meanwhile, cafe owners—particularly small- and medium-sized culinary enterprises—gain access to a centralized digital promotional tool without having to build and manage their own platforms, thereby enhancing their business visibility and competitiveness.

This research offers a practical contribution by providing an integrated cafe information solution for the public and business operators in West Jakarta, as well as an academic contribution by serving as a reference for the development of similar information systems in other regions or business sectors. Future development could expand the system by incorporating user-preference-based cafe recommendations (personalization/recommendation systems), integrating a wider range of digital payment methods, and extending geographical coverage beyond West Jakarta to maximize the system's overall utility.

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