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Information System Development for Web-Based Creative Services E-Commerce Using Rapid Application Development Method

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Abstract

This study aims to design and develop a web-based e-commerce information system for creative services at Cahaya Kreativ using the Rapid Application Development (RAD) method, addressing the company's lack of an integrated digital platform for managing service orders, portfolios, consultations, and online payments. The RAD method was chosen due to its emphasis on speed, prototyping, and close user collaboration—making it more suitable than traditional methods like Waterfall for projects requiring rapid development and ongoing user input in a dynamic service environment. The system was built using React.js for the frontend, Express.js for the backend, PostgreSQL as the database, Tailwind CSS for UI design, and Midtrans integration as a payment gateway. The development process included two iterations covering requirement analysis, system design (use case diagram, sequence diagram, class diagram, ERD), implementation, and testing through Blackbox Testing and User Acceptance Testing (UAT). Results indicate that the system operates according to specifications and has received positive user feedback. It is expected to enhance Cahaya Kreativ's operational efficiency, expand market reach, and improve the digital experience for customers ordering creative services online, while also supporting streamlined business processes, data consistency, and increased user engagement through responsive and interactive features. Stakeholder involvement throughout the development ensured the system closely matched real business requirements, resulting in a comprehensive digital solution that enhances customer satisfaction and operational performance through technology-driven innovation.

I. INTRODUCTION

The rapid development of information and communication technology has transformed many aspects of life. With the rise of the internet, software, and hardware, digital systems now support faster and more accurate access to information and enhance the performance of various sectors [1]. This evolution has led to significant changes in business operations, particularly in trade, where electronic commerce, commonly known as E-Commerce, has emerged as a major innovation facilitating digital transactions [2]. According to data from Statistics Indonesia, digital trade has shown substantial growth, with usage increasing by nearly 7% from 2020 to 2021, significantly contributing to productivity in the trade sector [3].

E-Commerce is defined as the electronic exchange of goods, services, or information via computers and the internet [4]. It allows users to transact without physical or temporal constraints, offering flexibility that traditional commerce lacks. This is particularly relevant in the creative services industry, which includes photography, videography, graphic design, and digital marketing [5]. These services often involve customized offerings, portfolio display, and scheduling flexibility, all of which benefit from digital platforms. Providers such as Cahaya

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Kreativ face challenges in handling orders, showcasing portfolios, and maintaining client communication. Currently relying on social media, their outreach and management remain limited.

The creative services industry presents unique operational challenges that go beyond simple transaction management. High customization, dynamic scheduling, real-time interaction, and the need for visually-driven portfolios require systems that are flexible, modular, and support continuous updates and communication. Without an integrated platform, providers struggle to deliver consistent, scalable quality especially in managing bookings and consultations across digital touchpoints.

Previous studies have noted similar challenges. One research identified that many photography providers lack a centralized system for marketing and service delivery [6]. Another found that clients often struggle to find trusted providers due to fragmented information across social media and offline advertising like flyers [7]. These issues indicate a need for a unified digital platform that connects providers and customers while enabling better access to booking and communication tools.

This study aims to address that gap by developing a customized web-based E-Commerce platform for Cahaya Kreativ, tailored to the operational and promotional needs of creative services. The objective of this research is to design and implement an integrated system that improves service workflow, enhances user experience, and facilitates digital transformation in the creative service sector. It also investigates whether the use of Rapid Application Development (RAD) and modern web technologies can support fast and user-driven system development that responds to real business needs.

Unlike general platforms, this system integrates portfolio management, customizable services, bookings, and consultation tools. It aligns technological functionality with practical requirements in the creative industry, offering a more specialized solution than generic alternatives. It also enables stakeholders to participate in development iterations, ensuring alignment with operational realities.

The goal is to develop a system that supports Cahaya Kreativ in managing services, packages, orders, and client interaction in a unified environment. The project adopts the Rapid Application Development (RAD) methodology, chosen for its flexible, iterative process and continuous user feedback, ensuring the final product meets real-world demands [8].

To support this, the system applies several modern technologies. React.js is used on the frontend to build reusable, dynamic interface components with Single Page Application (SPA) architecture [9]. ReactJS has the advantage that this framework provides speed, simplicity, and scalability [10]. Compared to other frontend frameworks like Angular or Vue.js, React's virtual DOM and component-based architecture offer better performance and maintainability for high-interactivity systems.

On the backend, Express.js serves as a Node.js-based framework that efficiently handles HTTP requests and modular middleware integration [11]. It simplifies backend logic while supporting scalable architecture [12]. Express is favored for its minimalistic yet powerful structure, especially compared to heavier alternatives like Laravel, which may require more setup and introduce complexity in rapid prototyping.

Frontend-backend communication is managed via RESTful APIs using standard HTTP methods like GET, POST, PUT, and DELETE [13]. These APIs return JSON-formatted responses, facilitating compatibility with other systems [14]. RESTful design ensures stateless, resource-oriented communication using URIs [15].

PostgreSQL is employed for data storage due to its reliability, security, and capability in handling complex datasets in large-scale projects [16]. It works well for projects of varying size and supports cross-platform deployment [17][18]. PostgreSQL is selected over MySQL for its advanced data type support and better concurrent read/write performance critical for real-time systems.

Finally, Midtrans is integrated as the payment gateway, supporting transactions via credit card, bank transfer, and digital wallets to ensure smooth and accessible checkouts [19][20].

In conclusion, this study provides a digital solution tailored to the creative services sector, with Cahaya Kreativ as a case study. By utilizing RAD and current web technologies, the system aims to close gaps in service delivery, communication, and promotion helping businesses meet evolving client expectations and digital market demands.

II. RELATED WORKS/LITERATURE REVIEW

Before proceeding with this research, it is essential to review relevant prior studies on the design and development of e-commerce systems for creative services, particularly those using the RAD method. These studies offer insights and reveal areas needing improvement, especially in integrating features within a single platform.

One study developed an M-Commerce app for ordering creative services such as graphic design, videography, photography, and social media management using RAD [5]. It showed that RAD supports the rapid development of functional applications, especially for mobile-based transactions.

Another study built a web-based photography e-commerce system using SDLC to enhance customer engagement and transaction management [6]. However, it lacked direct consultation features between clients and service providers.

A separate Android-based photography service system included a payment gateway to ease booking and payments [21], validated with Blackbox Testing, but lacked web integration and real-time consultation.

A RAD-based administrative web system replaced manual workflows and received positive User Acceptance Testing feedback [22], demonstrating RAD's strength in building user-friendly platforms despite not focusing on e-commerce.

Another study enhanced a photography service website using RAD, improving UI and booking through iterative updates [23], but still lacked consultation tools. An online platform for graphic designers used RAD and Blackbox Testing to validate features [24]. It supported portfolio showcasing and order management but did not enable direct client-designer communication.

These studies confirm RAD's effectiveness in creative service platforms, particularly for photography and design. However, most do not offer integrated consultation tools or combine key functionalities like transactions, portfolios, payments, and communication.

To address this gap, the current study proposes a comprehensive web-based e-commerce system for Cahaya Kreativ using RAD. It integrates sales, order management, portfolios, payment gateway, and real-time consultation to streamline workflows and enhance interaction. Moreover, most systems reviewed lack discussions on scalability for growing user bases and rarely reference global platforms like Behance or Fiverr, which combine portfolios and consultations at scale.

III. METHODS

The research in this chapter is conducted by outlining the stages of the research flow to help the researcher carry out the study in a clear, organized, and systematic manner. The method used in this stage is the Rapid Application Development (RAD) method. The following are the research flow stages carried out, as shown in Figure 1.

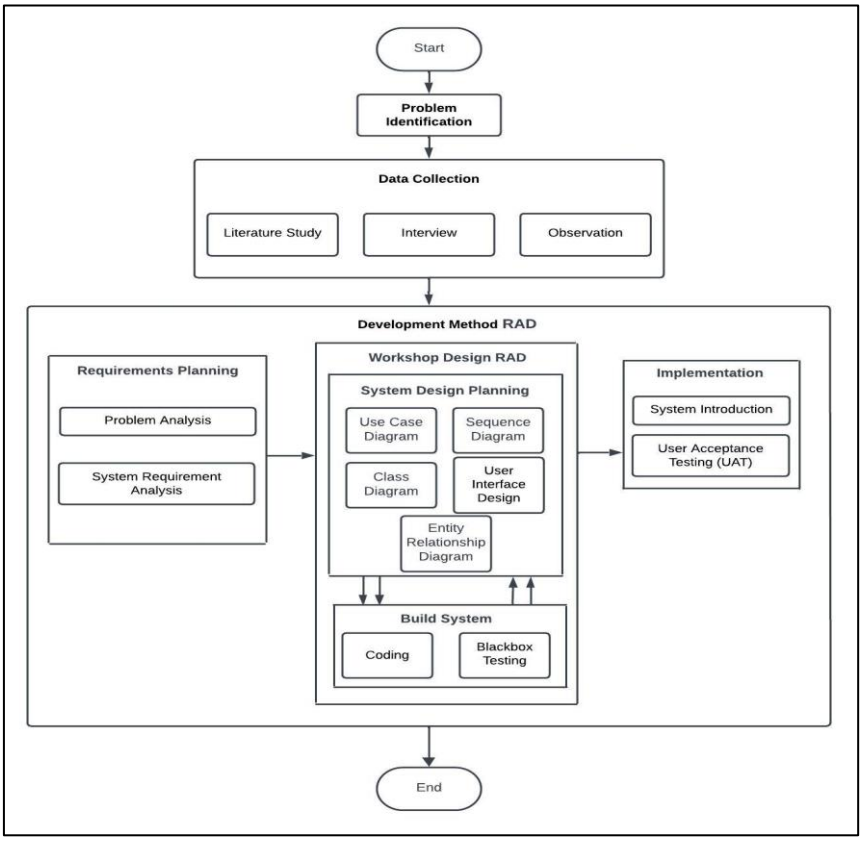

Fig. 1 Research Method Flow

A. Problem Identification

This stage identifies key challenges faced by creative service providers like Cahaya Kreativ. The main issues include limited access to organized information for finding and offering services and the lack of an integrated digital platform. This creates obstacles for optimizing service delivery and highlights the need for a solution that improves interactions and meets stakeholders' needs.

B. Data Collection

In the data collection phase, several methods were used to gather the information necessary to support the research objectives. A literature study was conducted by reviewing various theoretical and practical sources, including books, journals, and online materials, focusing on e-commerce systems for creative services and the application of the Rapid Application Development (RAD) method. This activity served as a foundation for establishing the research framework and guiding the system development process. Additionally, interviews were held with stakeholders, particularly with the CEO of Cahaya Kreativ, to gain firsthand insights and detailed information relevant to the operational challenges and system expectations. These interviews were conducted both face-to-face and remotely using communication tools such as WhatsApp and video conferencing. Complementing this, the researcher also performed direct field observations to understand the actual workflow and interactions between service providers and clients. This method allowed the identification of practical needs and obstacles encountered in day-to-day operations, which were crucial for defining accurate system requirements. The interviews involved three participants, including the CEO and two operational staff from Cahaya Kreativ, selected based on their direct involvement in service operations. Feedback loops occurred at the end of each RAD iteration totaling two iterations where users evaluated prototypes and suggested refinements.

C. Development Method RAD

The Rapid Application Development (RAD) methodology was selected in this study due to its iterative and collaborative approach, which emphasizes rapid prototyping and continuous user feedback to ensure the resulting system aligns with actual user needs [25]. The development process using RAD is divided into three primary phases. The first is the requirement planning phase, which involves identifying both user and system needs through direct collaboration with stakeholders. Within this phase, the researcher conducts problem analysis to determine inefficiencies or issues requiring improvement, followed by system requirement analysis to define system objectives, user roles, business processes, and essential features to be developed.

The second phase is the RAD workshop design phase, where system development is carried out in iterative cycles involving stakeholder input. This phase includes the creation of several design artifacts such as the use case diagram, which models the functions the system must support based on user requirements, and the sequence diagram, which details the flow of interactions and behaviors between objects over time. A class diagram is also developed to describe the structure and relationships among system entities. The user interface is then designed to define the layout and navigation of the application, followed by the creation of an Entity Relationship Diagram (ERD) to design the structure of the database. After finalizing the designs, system implementation begins through the coding process. Once implemented, blackbox testing is conducted to verify that each system feature operates correctly without inspecting internal code structures.

The final phase is implementation, during which the developed system is introduced to users for the first time. This phase includes a demonstration of the system's features, followed by User Acceptance Testing (UAT). During UAT, end users interact with the system to validate whether it meets functional and operational expectations. The feedback gathered from users in this phase becomes a critical input for final refinements, ensuring that the system is fully aligned with user needs before official deployment.

IV. RESULTS

A. Problem Identification

Based on the problem identification stage, several challenges were found in the creative service industry, including Cahaya Kreativ. These challenges involve limited access to organized information for finding and offering suitable services, and the lack of an integrated digital platform. This highlights the need for a solution that bridges stakeholders' needs to improve interaction and service optimization. This identification forms the basis for designing a system tailored to these needs through deeper data analysis.

B. Data Collection

The data collection process in this study involved several methods to obtain accurate and relevant information supporting the system development. The first method was a literature study, which entailed reviewing a variety of printed and online sources, including books and journals, that discuss the design of web-based E-Commerce systems for creative service bookings using the Rapid Application Development (RAD) method. This step was essential in building a strong theoretical foundation for the research, guiding the formulation of the literature review, the research methodology, and the development framework of the system.

The second method was interviews, conducted to gather data and insights directly related to the problems addressed in this research. These interviews were held either face-to-face or through digital communication tools such as WhatsApp and online meeting platforms. The researcher engaged in a direct dialogue with the CEO of Cahaya Kreativ, a creative service provider based in Surabaya, to obtain specific information regarding the company's operational challenges and needs in managing their services.

Lastly, the observation method was applied to collect data by directly monitoring real activities and interactions in the field. The researcher observed how Cahaya Kreativ delivered its services to customers, noting

actual workflows, communication patterns, and any challenges encountered during service delivery. The results of this observation provided valuable insights for conducting system requirements analysis and for formulating solutions that align with practical needs in the system's development and implementation.

C. Development Method RAD

The first phase in the Rapid Application Development (RAD) methodology is Requirement Planning, which focuses on identifying and defining user and system needs. A key part of this phase is Problem Analysis, where existing business processes are examined to identify challenges and inefficiencies. At Cahaya Kreativ, several issues were found due to conventional workflows, such as manual order processing and limited portfolio management. These findings form the basis for designing targeted solutions, as summarized in Table 1.

TABLE 1
CHALLENGES AND SOLUTIONS

No	Challenges	Solutions
1	Service Booking via WhatsApp Business	Currently, service bookings are handled through WhatsApp Business, which can be inefficient and unstructured. The proposed solution is to implement a computerized booking system to streamline and manage service orders more effectively.
2	Poor Portfolio Management on Instagram	Portfolio content, crucial for attracting customers, is not well-managed through Instagram. A dedicated system will enable efficient portfolio management and presentation to increase customer interest.
3	Conventional Marketing Strategies	Product marketing still relies on traditional methods with minimal digital integration. The proposed system will support digital marketing strategies to enhance the value and reach of the services offered.

The next step in the Requirement Planning phase is System Requirement Analysis, which was conducted based on interviews with Cahaya Kreativ. In this stage, the researcher performed an analysis and discussion to identify user requirements for the E-Commerce information system (CATIV). Through this process, a list of user needs was compiled, outlining the roles and system functionalities required by each type of user. The system is designed to accommodate three primary user roles: Admin, Employee, and Customer, as shown in Table 2.

TABLE 2
SYSTEM REQUIREMENTS

No	Role User	Requirement
1	Admin	The Admin has full access and control over all system features and functionalities. Their responsibilities include system monitoring, handling customer consultations, and recording sales transactions.
2	Employee	Employees are responsible for managing features that are visible to customers. Their tasks include processing orders, maintaining the service portfolio, and managing the product catalog to ensure accurate and up-to-date content.
3	Customer	Customers interact with the system to register an account, browse product information, consult with service partners via chat, place service orders, make payments, and leave reviews based on the service received.

The second phase in the Rapid Application Development (RAD) methodology is RAD Workshop Design, which focuses on the collaborative and iterative design of the system. The first activity in this phase is the creation of the use case diagram, which aims to illustrate the behavior and functional interactions within the E-Commerce information system for creative services at Cahaya Kreativ. The use case diagram is presented in Figure 2.

Figure 2 shows the use case diagram of the overall system to be developed. There are three main actors in the system: admin, employee, and customer. The admin manages the entire system and some service management tasks such as consultations. The employee is responsible for managing several tasks, including managing products, categories, orders, and others. Meanwhile, the customer can register an account in the system and place service orders up to the payment process.

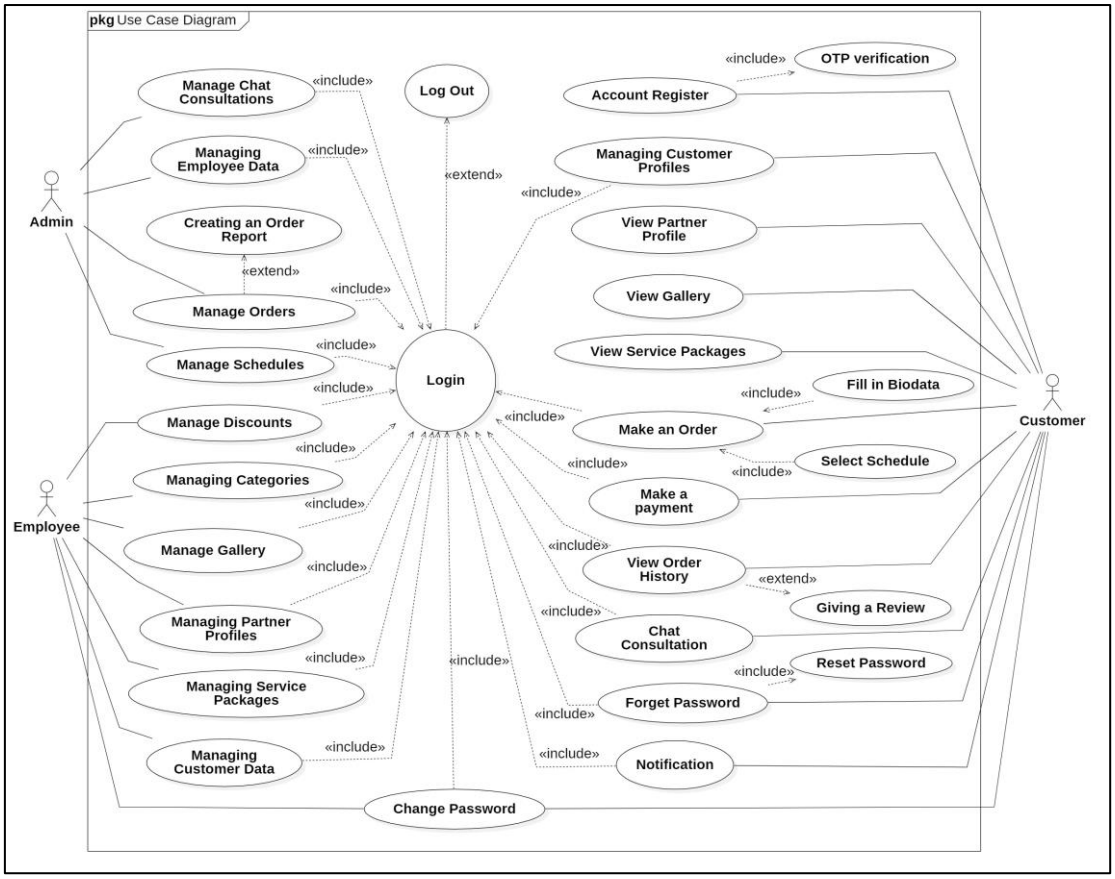

Fig. 2 Use Case Diagram

Following the creation of the use case diagram in the RAD Workshop Design phase, the next step is the development of the sequence diagram. This diagram illustrates how objects interact within a specific use case scenario by showing the sequence of messages exchanged between them throughout their lifespans. The sequence diagram is presented in Figure 3.

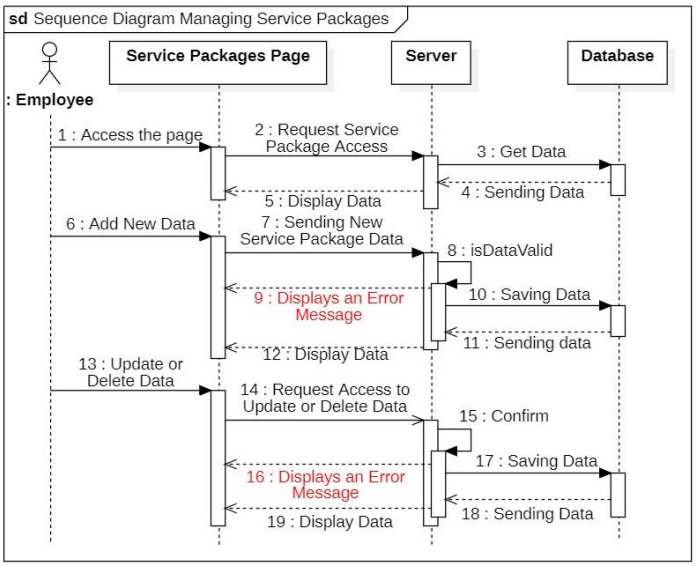

Fig. 3 Sequence Diagram

Figure 3 describes the workflow for managing service packages carried out by employees. The employee accesses the partner dashboard and then requests access to the service package list menu from the server. The server retrieves the service package data from the database to be displayed on the partner dashboard page. In this menu, the employee can add new service packages to be displayed on the customer-facing website. In addition to adding service packages, the employee can also update and delete existing ones.

After developing the sequence diagram, the next component designed in the RAD Workshop Design phase is the class diagram. This diagram helps visualize the structure of system objects and serves as an effective tool for planning and understanding the design in object-oriented software development, as illustrated in Figure 4.

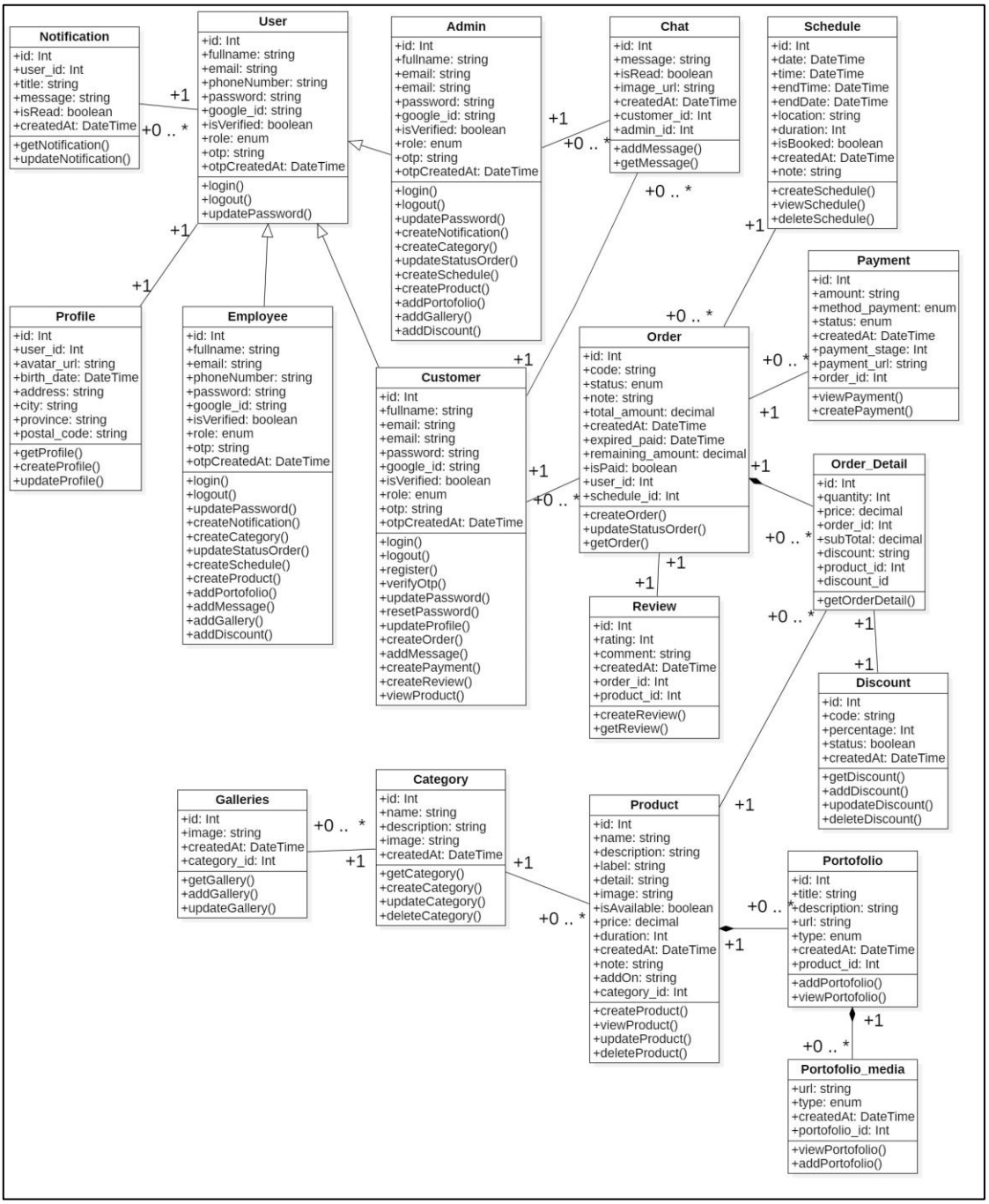

Fig. 4 Class Diagram

Figure 4 illustrates the class diagram representing all accessible features. It starts with the users table, which has inheritance into three roles: admin, employee, and customer. Employees can manage various tasks, while customers can perform activities such as ordering, making payments, consulting, and more.

Following the class diagram, the next step in the RAD Workshop Design phase is the user interface (UI) design. This process involves creating interface layouts and menu structures that enhance the user experience for all user roles by ensuring ease of use and intuitive navigation. The UI design is illustrated in Figure 5.

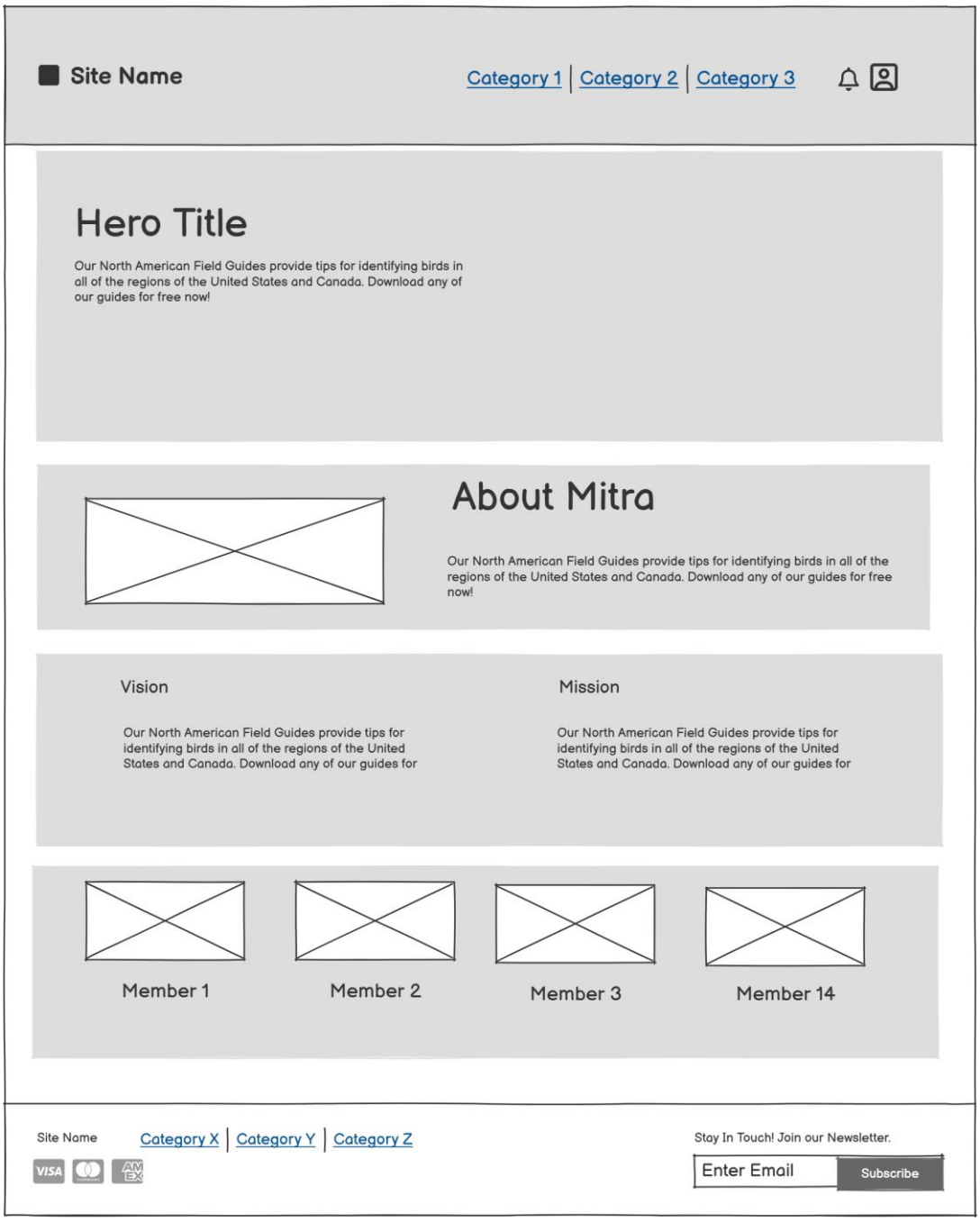

Fig. 5 User Interface Design

Figure 5 shows a user interface design for the customer homepage. This page aims to display information about partners, including offered service categories, company profile, and other relevant details.

Following the user interface design, the next step in the RAD Workshop Design phase is creating the Entity Relationship Diagram (ERD). This process aims to develop a database structure that aligns with the defined system requirements and corresponds to the previously planned user interface design. The ERD design is illustrated in Figure 6.

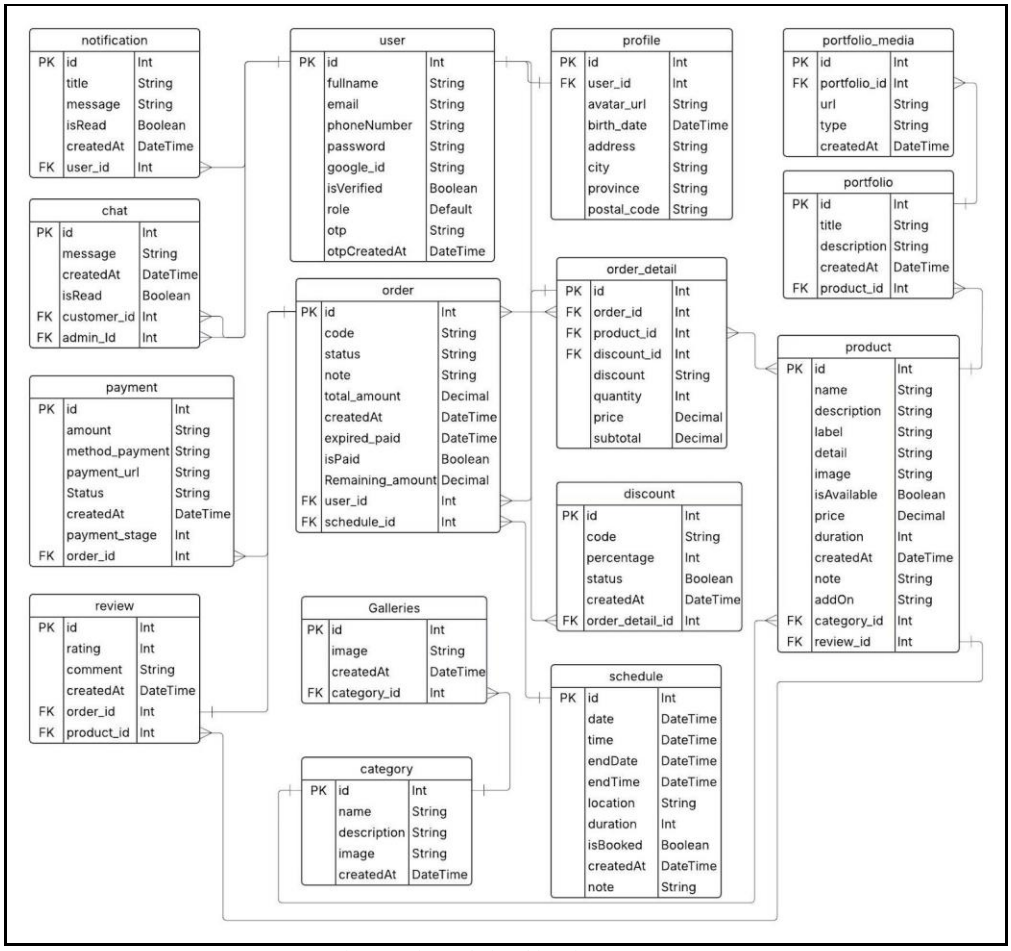

Fig. 6 Entity Relationship Diagram

Figure 6 illustrates the database design for the system to be developed. It consists of 15 tables to store various types of information, including user, notifications, profile, chat, gallery, orders, payments, and others.

After the system design is approved by the user, the development phase moves forward with coding and implementation. At this stage, the system is built according to the specifications outlined in the approved design. This process ensures that the functional components of the system operate as intended and are ready for the testing phase.

Following the coding phase, the system proceeds to the testing stage to ensure that all implemented features function correctly. Blackbox testing is conducted by providing various types of input to verify that the system's outputs align with the expected results. This type of testing focuses solely on the functionality of the system without analyzing its internal logic, as detailed in Table 3.

TABLE 3
BLACKBOX TESTING

No	Scenario	Expected Results	Test Results	Status
1	Enter the order page by clicking the order button on the product details.	The system successfully displays the order form.	The system successfully displays the order form.	Success
2	Performing input without filling in one of the mandatory input forms.	Displays an error message that “Field is required”	Displays an error message that “Field is required”	Success
3	Fill in the input for the booking date or time that already exists in the database.	Displays an error message that “Schedule is Booked”	Displays an error message that “Schedule is Booked”	Success
4	Filling in the booking time input exceeds the partner's working hours limit	Displays an error message that the order is only valid during working hours (7am 5pm)	Displays an error message that the order is only valid during working hours (7am 5pm)	Success
5	Place an order and enter the discount code	Displaying prices based on discounts received	Displaying prices based on discounts received	Success

Table 3 shows the results of Blackbox Testing, which is part of the service ordering testing process. Several test scenarios have been designed and executed to evaluate whether the system produces outputs that meet the expected results. This testing aims to ensure that the service ordering feature works properly without directly

examining the underlying code implementation. Thus, the test results provide an objective overview of the system's reliability and functionality in handling various ordering conditions.

The implementation stage represents the final phase of the RAD method. At this stage, the completed system is introduced and demonstrated to Cahaya Kreativ and prospective service users. Following the system introduction, User Acceptance Testing (UAT) is conducted as the final testing phase prior to full deployment, aiming to ensure the system meets user needs and expectations in terms of functionality and usability. For the Cahaya Kreativ E-Commerce Information System, UAT involved three primary user roles: admin, employee, and customer. Each role tested essential system features through both predefined and ad-hoc scenarios, such as service ordering and data management. After the testing process, users provided feedback on aspects such as system usability, response speed, and interface comfort. This feedback was then used to evaluate how well the system fulfilled user expectations from both functional and user experience perspectives.

TABLE 4
USER ACCEPTANCE TESTING ADMIN

No	System Scenario Admin	Status/Comment	Testing Date
1	Login	Accepted	May 30, 2025
2	Create Notification	Accepted	May 30, 2025
3	Manage Product Categories	Accepted	May 30, 2025
4	Manage Code Discount	Accepted	May 30, 2025
5	Manage Orders	Accepted	May 30, 2025
6	Manage Products	Accepted	May 30, 2025
7	Manage Portfolios	Accepted	May 30, 2025
8	Manage Schedule	Accepted	May 30, 2025
9	Manage Chat Consultations	Accepted	May 30, 2025
10	Create New Employee Account	Accepted	May 30, 2025

Table 4 shows the results of the User Acceptance Testing (UAT) for the admin role. Several scenarios were designed and executed to ensure that the system was accepted according to user requirements. The results indicate that the system has been tested and accepted.

TABLE 5
USER ACCEPTANCE TESTING CUSTOMER

No	System Scenario Customer	Status/Comment	Testing Date
1	Authenticate	Accepted	May 30, 2025
2	Profile Customer	Accepted	May 30, 2025
3	Notification	Accepted	May 30, 2025
4	Change Password	Accepted	May 30, 2025
5	Get Galleries Data	Accepted	May 30, 2025
6	Get Products	Accepted	May 30, 2025
7	Order & Payment	Accepted	May 30, 2025
8	Order History	Accepted	May 30, 2025
9	Review Product	Accepted	May 30, 2025
10	Chat Consultation	Accepted	May 30, 2025

Table 5 shows the results of the User Acceptance Testing (UAT) for the customer role. Several scenarios were designed and executed to ensure that the system was accepted according to user requirements. The results indicate that the system has been tested and accepted.

V. DISCUSSION

The development and testing of the Cahaya Kreativ E-Commerce Information System confirmed that the application of the Rapid Application Development (RAD) method was effective in facilitating the rapid creation of a system that meets user expectations. Through iterative design and continuous feedback from stakeholders, the resulting system successfully integrates core functionalities such as service ordering, portfolio management, consultation via chat, and digital payments. Blackbox Testing results showed that the system behaves as expected under various input conditions, while User Acceptance Testing (UAT) confirmed user satisfaction with system usability and interface responsiveness.

Compared to similar studies, this research addresses a critical gap identified in previous literature. Earlier systems often focused solely on portfolio management or service booking without integrating consultation and communication tools. By contrast, this study implements a chat-based consultation feature, offering a more interactive user experience. Furthermore, this system merges marketing and transaction functionalities into a unified digital platform, streamlining user access and business workflows.

Despite the positive outcomes, the research also has limitations. For example, the current system only supports a web-based platform and lacks a native mobile application, which may limit its accessibility on certain devices. Additionally, while the system includes chat functionality, it does not yet support real-time notifications or multimedia attachments within the chat, which could further enhance client-provider interactions.

Future research should focus on expanding this system into a mobile-friendly application and integrating real-time communication technologies such as WebSocket for live chat support. Real-time communication features, such as live chat or instant notifications, have the potential to significantly enhance customer satisfaction and operational coordination by reducing delays in clarification or service adjustments. Moreover, adding features like automatic invoice generation, AI-based service recommendations, and performance analytics could offer added value for both users and administrators.

VI. CONCLUSIONS

This research contributes by designing and developing a web-based e-commerce information system tailored for creative service providers, with Cahaya Kreativ as the case study. The main research problem addressed was the absence of an integrated digital platform to manage service orders, portfolios, client consultations, and online payments. Through the implementation of the Rapid Application Development (RAD) method, the study provides a clear and practical solution that combines several core functionalities into a unified system. This includes order management, portfolio display, chat-based consultation, and integration with a payment gateway features that collectively enhance business workflows and customer interaction.

The findings from system testing, including Blackbox Testing and UAT, indicate that the developed system meets functional expectations, with over 100% of tested features marked as 'Accepted' by users. This study demonstrates that applying RAD in a highly customized service context enables faster iteration cycles and better stakeholder alignment a lesson applicable to other small creative businesses seeking digital transformation. The research explicitly answers the main question by demonstrating that the RAD method enables fast and iterative development aligned with real user needs. Furthermore, the system's integrated features represent a notable contribution compared to previous studies that often focused only on transactional or promotional aspects. This work offers a reference model for similar businesses aiming to digitize service operations while improving customer experience and communication through a single, cohesive platform.

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