Website Analysis and Design Using Iconix Process Method Case Study: Kedai Lengghian

Anindo Saka Fitri[1], Eli Nurhayati[2], Nadilla Anidew[3], Anindita Pratita[4], Syifa' Saskia Elfaretta[5]

[1,2,3,4,5]Information System Department, University of Pembangunan Nasional Veteran Jawa Timur, Indonesia
[1]anindo.saka.si@upnjatim.ac.id (*)
[2,3,4,5][20082010115, 20082010127, 20082010139, 20082010152]@student.upnjatim.ac.id

Abstract— *Kedai Lengghian* is one of the culinary businesses that has not applied technology to support its business processes. In the era of globalization, information technology is developing rapidly, allowing for business development. The development of information technology has an impact on the tight competition in the culinary business. Researchers provide solutions so that the managers and employees of *Kedai Lengghian* can increase the effectiveness and efficiency of business processes there. This is done by analyzing and designing a website-based information system that can later help implement system creation. Before creating an information system that suits the needs of its users, it is necessary to analyze and design software. Researchers use the Iconix Process method because the concept of building a system that is run focuses on the needs of its users. The Iconix Process has four stages: requirement, analysis, preliminary design, detailed design, and implementation. Kedai Lenghian can use information system technology to become a reference at the level of system implementation. In addition, this website-based information system is expected to increase the effectiveness and efficiency of the store's business processes and become an attraction for *Kedai Lengghian* consumers. The result of Website Analysis and Design Using the Iconix process is an object-oriented design that can then be coded. Also, its produced UML design gives Kedai Lengghian a picture of website making based on user needs, system needs, and system design.

Keywords— Website Development, Analysis and Design, Iconix Process, Functional Requirement

I. INTRODUCTION

In the modern era, there are many changes, one of which is information technology. Nowadays, technology cannot be separated from human life because technology has an impact on various aspects of life. Advances in technology ease work so that it becomes efficient and effective, make it easier for humans to get accurate information, communicate faster with others, and so on [1]. Supported by the internet and being a medium of communication, the internet also provides opportunities for someone who runs a business. Following existing developments, humans are also changing to become more and more modern [2].

Based on the research results by Anita Asnawi, it is stated that the number of internet users in Indonesia recorded until March 2021 reached 212.35 million people. When sorted by ranking, Indonesia is ranked third below China. Based on this, it can be concluded that the Indonesian people make the internet one of the primary sources to meet their daily needs [3]. As already mentioned, there are many benefits of advances in information technology in various fields, including business. Lengghian Shop located on Jl. K.H, Moch, Kholil 123 Kemayoran Kec. Bangkalan, Bangkalan Madura Regency, is a culinary business that has not utilized information technology to help its business processes. Even though nowadays technology has become a competitive advantage for culinary businesses. No wonder there are so many culinary businesses that compete to take advantage of technology in their business.

It is necessary to understand that the ordering process and transactions in the *Kedai Lengghian* are done manually. This makes the managers and employees at *Kedai Lengghian* still conventional, spending operational costs to print menu books, write payment receipts, buy paper and ink, and so on. *Kedai Lengghian* is still not effective in the process of making sales reports. This is because it is still done manually using handwritten on a financial notebook. Overall, business activities at *Kedai Lengghian* are still ineffective because everything operates traditionally and can allow for the loss of proof of financial records and swelling of paper and ink purchase costs, where all of this can be minimized if utilizing the technology in it.

The research aims to facilitate the sale of the culinary business *Kedai Lengghian*. In addition, another goal is to change the food and beverage ordering system that was initially still traditional to modern by utilizing technology that is automatically controlled by website applications. Technology is expected to increase the effectiveness and efficiency of business processes at *Kedai Lengghian*. In addition, this website-based ordering information system is valuable and able be an attraction for Consumers of *Kedai Lengghian*.

However, a good design is also needed to utilize technology in the Kedai Lengghian. The created information system must meet the functional needs of its users. The success of the software will be measured by its ability to fulfill the requirements of all its users [4][5]. It is required to perform software analysis and design to develop an information system that satisfies the needs of its end users. Researchers throughout

the production process utilize the method known as the Iconix Process. This method is one of the concepts of system development that focuses on the needs of its users [6]. The Iconix process is a development method that does not discuss the application's analysis, design, and implementation. Use Iconix Process method also implement the Use Case model, which has been designed to determine the model and behavior of the system built [7]. This method has advantages because it provides a minimalist and efficient approach to using UML. The Iconix Process method focuses on model design as system architecture to make it easier to build the system [8]. Based on related research literature, this method consists of two models: dynamic and static. It encloses a Use Case diagram, Robustness diagram, and Sequence diagram, while a static diagram there are domain model and Class diagram [9].

II. LITERATURE REVIEW

A. Iconix Process

The Iconix Process is a process for developing software that emphasizes model design as a component of the system architecture. Two models make up the Iconix process. The first type of model is a dynamic one, representing the system's behavior. In addition to a sequence diagram, there is also a use case diagram and a robustness diagram. Dynamic, domain model updates, and diagram classes are the two static models that define the structure or what will be coded [10]. So the result of the Iconix process is an object-oriented design that can then be coded. The Iconix Process has four stages: requirement, analysis, preliminary design, detailed design, and implementation [11]. Each stage of the Iconix process is regrouped respectively. First, at the requirements stage, there is a functional requirement process (collecting data to be processed), domain modeling (containing software needs that are functional and nonfunctional), and GUI Storyboard (identifying activities carried out by actors). The two stages of analysis and preliminary design are robustness analysis (helping to analyze diagrams, bridging from actual design analysis with coding implementations) and updating the model domain (eliminating duplicate or ambiguous classes and adding those not in the modeling). The three stages of detailed design, namely the sequence diagram (there is a flow chart which is a continuation of the robustness diagram), updating the model domain (the result of the sequence diagram adjusted to the needs of the software). The four stages of implementation, namely coding/testing (application development process) and integration, and scenario testing (testing the system).

B. Graphical User Interface (GUI)

Graphical User Interface (GUI) is an interface on the operating system of a computer device that uses a graphical menu that functions to make it easier for users to interact with the computer device [12]. GUI has a significant role because it is a medium of interaction between users, software, and hardware in the computer. The GUI also allows users to run a program easier and more comfortably.

C. Domain Model

The domain model is an area (domain) that contains the results of classifying noun objects in the system requirements list. It has been grouped based on the focus of the same problem area to be used as a candidate class in the diagram class. The model domain is described using UML notation, consisting of classes, attributes, relationships, and rules. The domain model provides an accurate picture of objects and information from a domain through the embodiment of class abstraction (conceptual class).

D. Use Case Diagram

Use Case diagrams are imaging processes that are carried out to show the relationship between the user and the system being designed [13]. The result of the representation of the scheme is made simple and aims to make it easier for users to read the information provided. The Use Case diagram describes an interaction between one or more actors and the system to be created [14].

E. Robustness Diagram

A robustness diagram is an object drawing of a use case that aims to perfect the use case text and object model. Robustness diagrams are created to help bridge the existence of free space from the actual design analysis of the coding implementation of the system [15]. As for the structure of the Robustness diagram, it includes:

- Boundary objects are interfaces between the system and the outside world. Boundary objects are usually layers or web pages on which actors can interact.
- Entity objects are classes of the model domain.
- The controller is a link between a boundary object and an entity.

F. Sequence Diagram

Sequence diagrams are one part of UML (Unified Modelling Language) that describes the relationship running from one object to another. The sequence diagram displays communication between objects sorted by time. The sequence diagram is used to discover the series of messages related to many existing objects [16]. It shows the events that occur on a particular object when the system is executed.

G. Class Diagram

The class diagram is a type of diagram used to demonstrate a class's existence and the links between the classes that make up a system. A class contains several attributes and functions to operate that class's activities. Diagram classes are at the core of object-oriented design due to their easy-to-use depictions. So, in a class, this diagram illustrates a system in detail, starting from the structure and its description, namely attributes, methods, and relationships between the classes [17].

III. RESEARCH METHODOLOGY

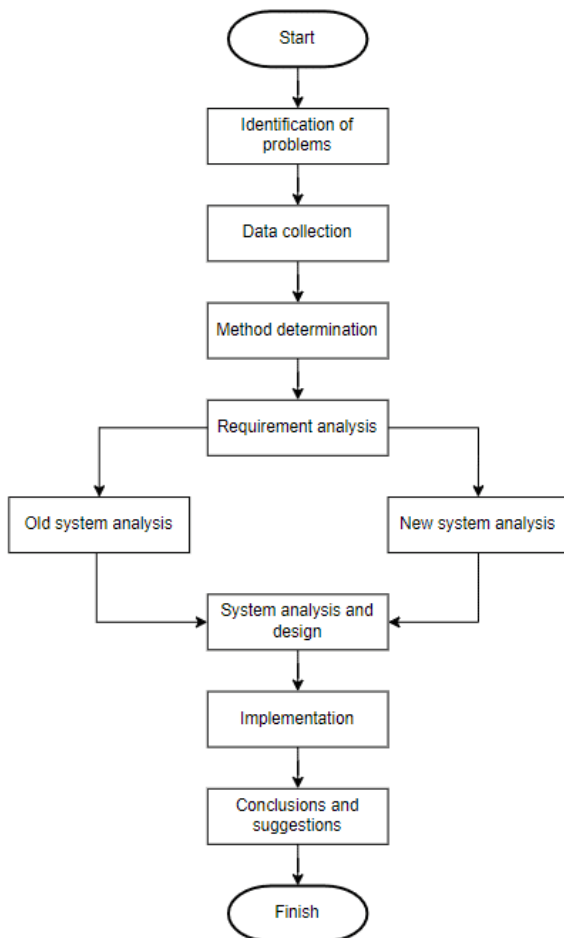Figure 1 below is the methodology used during this research.

Figure 1. Methodology Flowchart

1) Identification of problems: The problem behind this research is the operational activities at the *Kedai Lengghian,* which are still running manually, especially in ordering and recording reports. This leads to service inefficiencies and potential redundancy, duplication, and data inaccuracy.

2) Data collection: Data collection aims to obtain detailed information about the needs of *Kedai Lengghian* and other matters related to the design of the system that will be made in the future. This process was done through direct observation at the *Kedai Lengghian* and an interview with Mr. Moch. Burhan Arif is the owner of the *Kedai Lengghian.*

3) Method determination: In this study, the Iconix Process method was chosen as the method that will be used in the analysis and design of the *Kedai Lengghian* Website system. The Iconix Process method was chosen because it describes the system in more detail than other system design methods.

4) Requirement analysis: Requirement analysis is carried out by analyzing the old system and the needs of the new system based on the business processes at the *Kedai Lengghian.*

5) System analysis and design: After the system's needs are analyzed, further analysis and design of the system are carried out. System analysis and design are carried out in a structured

manner based on the stages of the Iconix process. The starting requirements stage produces functional requirements, Graphical User Interface (GUI), domain models, and use case diagrams. The analysis or preliminary design stage produces robustness diagrams, and the detailed design review stage produces sequence diagrams and class diagrams.

6) Implementation: Based on the results of the analysis and design of the system that has been made, the implementation stage of the *Kedai Lengghian* website design is then carried out.

7) Conclusions and suggestions: The last step is conclusions and suggestions. Conclusions are drawn based on the results of the entire research process, while suggestions are formulated based on the obstacles faced and recommendations that can be considered for future research.

IV. RESULT AND DISCUSSION

A. Requirement Analysis

1) Old System: Although the purpose of the development is to design a new system, the analysis of the old system is still indispensable as one of the processes by which this analysis is carried out to know how the initial procedure of the case is being developed. The goal is to facilitate the creation of a new system expected to help *Kedai Lengghian*, especially in the store's ordering and data management system.
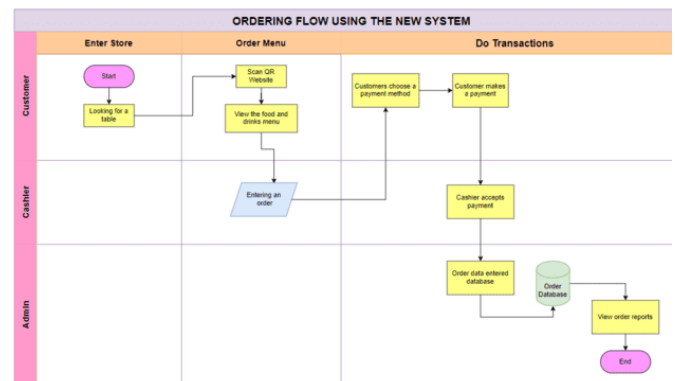

Figure 2. Ordering Flow of Old System

Figure 2 is the order flow in the old system of *Lengghian Kedai,* where the actors involved were customers and cashiers. The order flow in the old system is (i) the customer came to the store, (ii) approached the cashier, (iii) the customer saw the food and drink menu, (iv) the customer ordered food and drinks, (i) the cashier took the order, (v) the cashier calculates the total price, (vi) the customer makes a payment, (i) the cashier receives the payment, (vii) the cashier processes the order.

2) New System: After analyzing the old system, a new system was further designed, which is the purpose of the development. The new system's design is carried out by collecting the required data first. The data was obtained by making observations of the *Kedai Lengghian* and conducting a brief interview.

The new system's design does not have much difference from the old one. The biggest change in modifying the food and beverage menu ordering process was using a QR scan to see the menu.
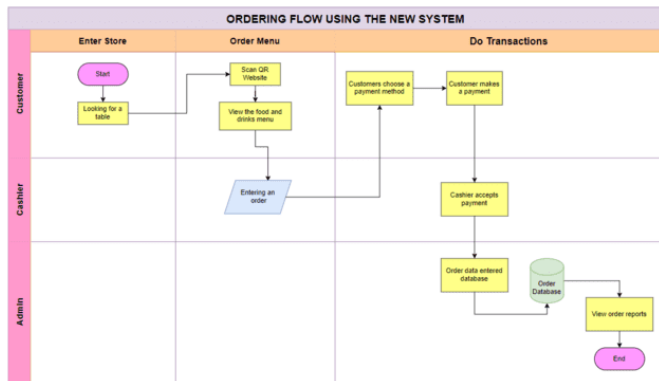

Figure 3. Ordering Flow of New System

In Figure 3, it can be seen that the new system of *Kedai Lengghian* has the addition of an actor, namely the Admin. Here is an explanation of the flowchart flow of the new system of *Kedai Lengghian* (i)customers come to the store, (ii)customers looking for tables, (iii)customers scan the QR code to see the food menu, (i)customers see food and beverage menu, (iv)after determining the food and drinks to order, the customer approached the cashier, (v)the cashier enters the customer's order into a website-based food ordering application, (vi)the customer chooses the payment method they want to use, (vii)the customer makes a payment according to the total price using the payment method that has been selected, (i)the cashier accepts payment, (viii)order data goes to the database, and (ix)admin view order reports.

There is a difference between the old and new systems proposed. In the old system, customers still see the menu through the menu book, while in the new system, customers only need to scan the QR code, which will later take users to the website page and see the menu through the website.

Then there is the addition of a system to the cashier so that the cashier can input customer orders through the cashier's website. The website will later calculate the number of orders automatically and enter all order data into the database. Adding an Admin actor played a role in managing the entire data. Admins can also view order reports according to input by the cashier.

B. System Analysis and Design

1) Functional Requirement: This website displays features that can be accessed by customers, cashiers, and admins as follows:

- Product Menu feature to display food and beverage menu information. This feature consists of three menus: the menu about us, food, and drinks.
- Transaction Feature to place food and beverage orders. There are three menus in this feature, namely the add order menu, payment menu, and order history menu.

- Transaction Report feature to display all transaction data within a certain period.

Then, the following are the actors in the system:

- Customers can see information related to the menu through the product menu feature on the website through a QR scan.
- Cashier enters the customer's order through the website. The cashier can view the order list information.
- Admin can view booking list information in the transaction feature.

2) Graphical User Interface (GUI): Figure 4 is the GUI of the login page for the cashier, were previously. The admin's username and password had been created through the account database. The cashier is asked to enter the registered username and password to log in and access the order dashboard. This login page also has a validation system for checking the username and password inputted. When the login is successful, the cashier will be immediately directed to the order dashboard, as seen in Figure 5.
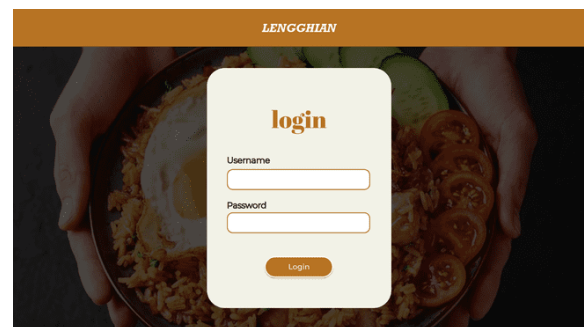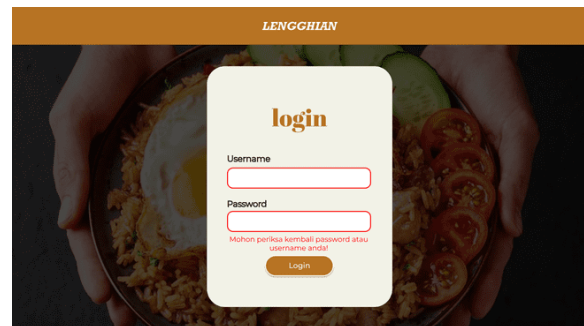

Figure 4. GUI of Login

Figure 5. GUI of Login if the Login Fails

Figure 6 is the GUI of the menu ordering page where the actors involved are the cashiers. The cashier inputs orders based on orders from customers. In this order menu page, the order id is automatically filled by the system, while the cashier manually fills in the order date and customer name. In the upper right corner, there is a search line to make it easier for the cashier to enter the menu ordered by the customer. Then there are buttons (+) and (-) that increase and decrease the number of food menus ordered. After the order input details are filled in, the cashier must click the Finish button to save the order data into the database and proceed with the transaction to the payment verification page.
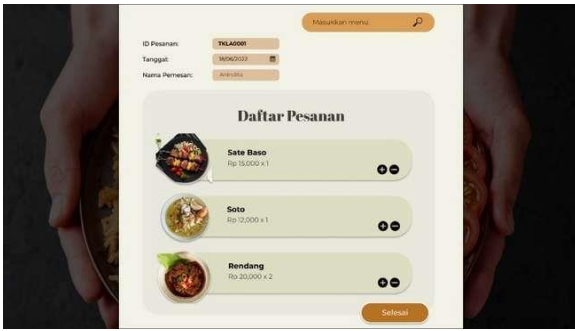
Figure 6. GUI of Ordering

3) Domain Modelling: After the process of requirement analysis and determination of nouns or objects to be described, then the depiction of the model domain is carried out. Figure 7 is a system model domain where the actors involved are cashiers and admins who directly interact with'*s* system. The description of these objects uses two relationships, namely the relation has-a (has) and is-a (is) [18]. The object is related until it can finally bring actors together with each other actors so that they can form a domain of interrelated systems.
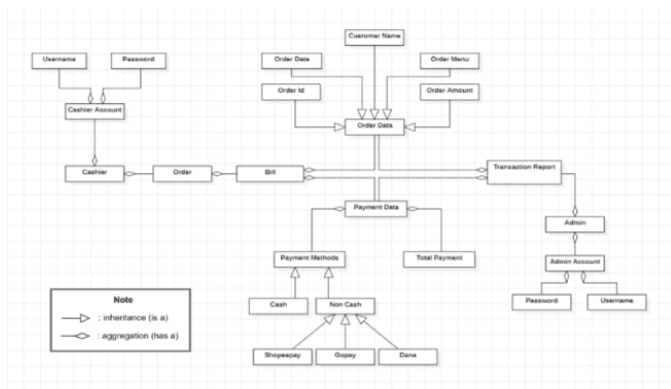

Figure 7. Domain Modelling of *Kedai Lengghian*

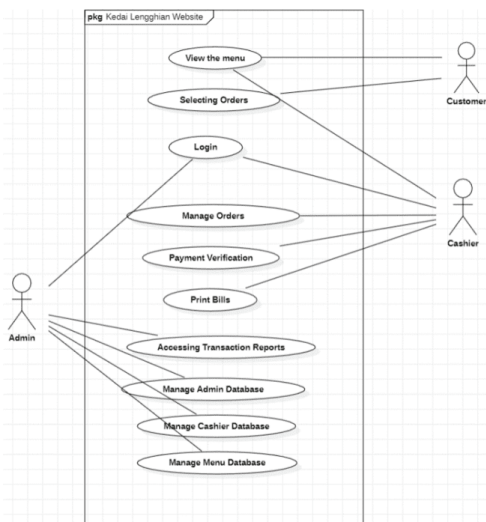*4) Behavioral Requirement:* Based on the GUI display design in Figure 8.

Figure 8. Use Case of *Kedai Lengghian*

A use case diagram is created that illustrates the needs of the new system features of *Kedai Lengghian*. In the designed use case diagram, there are 11 use cases and 3 actors, namely customers, cashiers, and admins. There are 2 customer actors, namely looking at the menu and selecting orders. The cashier actor has 5 use cases: login, order input, managing orders, verifying payments, and printing notes. While the admin actor also has 5 use cases, namely logging in, accessing transaction reports, managing the admin database, managing the cashier database, and the last one, managing the menu database.

5) Robustness Analysis: At this stage, system analysis is carried out using a robustness diagram as a use case object that bridges the design with system coding [19]. For example, the picture below is a robustness diagram of the use case of managing bookings.
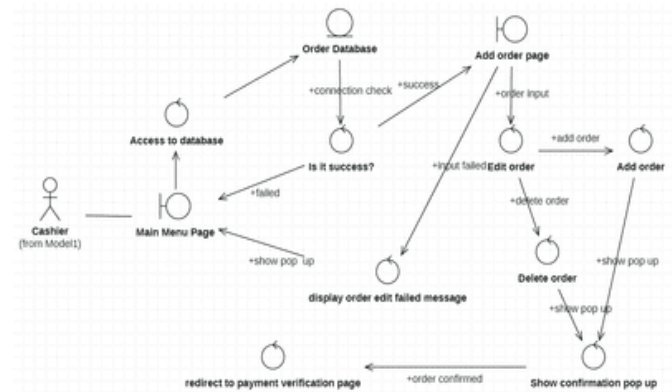

Figure 9. Robustness Diagram of Ordering System

In Figure 9, the actor involved in the diagram is the cashier. Where to manage orders, the cashier must first access the main menu page. The system will access the order database to access the add order page. The page will be redirected to the add order page if access is successful. If access fails, the page will be redirected to the main menu page. On the add order page, the cashier inputs the order. Orders that have already been input can be edited by adding orders and deleting orders. After the order edit is successfully performed, the system will display a confirmation pop-up. The cashier will confirm the order then the system will redirect to the payment verification page.

6) Sequence Diagram: In the sequence diagram stage, the pre-made robustness is formed into dynamic objects that are interconnected. This flow is made based on the time sequence of its occurrence in a system. These objects are connected to string together a message each other to produce a related activity.
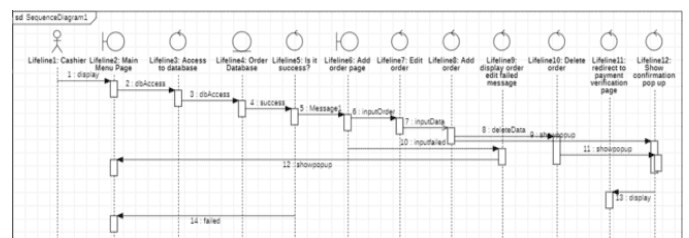

Figure 10. Sequence Diagram of Ordering System

In Figure 10, a sequence diagram of managing bookings is given. Starting from the actors involved, namely the cashier, the cashier accesses the main menu page. From that page, the booking database is called. Furthermore, suppose the database access is successful. In that case, it will enter the add message page to input customer orders, and then the cashier can edit the order, such as adding or removing charges. After the customer's order is completed, an order confirmation pop-up will appear, which later, if appropriate, will be directed to the payment verification page. It is different if the database fails to be accessed, then the cashier cannot input the order menu and remains on the main menu page.

7) Class Diagram: The diagram class stage is at the core of object-oriented design [20]. At this stage, a detailed depiction of the structure and description of a class is carried out. Starting from the attributes in it, related operations, to the relationship between one and another class.
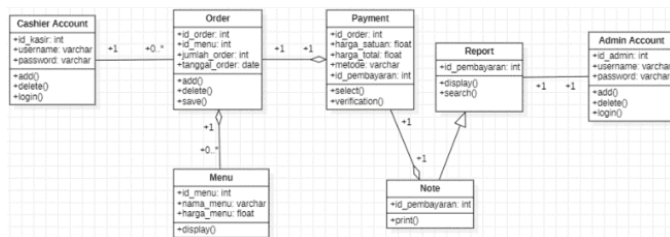

Figure 11. Class Diagram of *Kedai Lengghian*

The diagram class in Figure 11 has some classes, including cashier accounts, orders, menus, payments, notes, reports, and admin accounts. Each of these classes has associated attributes and operations (methods) that support its activities. Furthermore, the single courses are connected by association, aggregation, and generalization lines with various cardinalities. Like the cashier account with a cardinality value of $1 – 0..*$ against the order, each object of the cashier account class has many things against the order class. Furthermore, the order has a cardinality value of $1 – 1$ against the payment, illustrating that each order class has one object against the payment class. In addition to these two cardinality values, there is a cardinality value of $0..* - 1$, denoted by the relationship between menu and order. This cardinality value indicates that many objects that belong to the menu class have one object that belongs to the order class.

C. Implementation

At this stage, a change of the draft or plan is carried out into concrete actions. The implementation stage is achieved by realizing the system's development proposed to *Kedai Lengghian*. This process must proceed following the initial thoughts that have been discussed so that the goal can be truly achieved [21].

V. CONCLUSION

The website of *Kedai Lengghian* was designed using the Iconix Process method. The Iconix Process method consists of four stages: requirement, analysis, preliminary design, detailed design, and implementation. The first step taken by the researcher is to analyze the needs by creating an ordering flow for the old and new systems. For the old system, business processes are still carried out manually. Each report archive is stored using a paper recording. At the same time, the new system is compiled so that incoming orders and transactions can be directly stored in the database so that the report archive can be stored more securely and neatly arranged. Next, entering the second step, the researcher performs the analysis and design of the system. Here the researcher starts from the requirements section, which consists of functional needs analysis, GUI display, domain modeling, and behavioral requirements. Then enter the analysis and preliminary design section to make a robustness analysis. Furthermore, at the end of the system's analysis and design, the researcher details the system design through sequences and class diagrams. The research produces UML design, which gives a picture of website making based on user needs, system needs, and system design.

It is intended that the website design can be put into action in a step-by-step manner following what has been explained in part before this one to produce a business process that is more effective and efficient. Then for the next, research is also expected to be able to develop the website more fully again, not limited to the ordering process and transactions, but what is needed will be able to be made to design the website system again.

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