E-Transaction Services for Retail Business Process in IoT using Object Analysis and Design

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Abstract. The transaction process in business is an important factor that must be maintained for a business increase. This activity can be maintained by computerized. Application of computer which help process business transactions is an important thing that should be provided. This research aims to provide a system that helps routine transaction in daily food sales. Transaction in this system has included activities such as ordering, fulfil orders, payment, recording, financing, and reporting to management. Implementation of the system, that have used a prototype system development method. At each stage of the prototype is assisted by object-oriented programming, namely UML (Unified Modelling Language). Use of UML diagrams includes use case diagrams, activity diagrams, sequence diagrams, class diagrams, and deployment diagrams. The results of this research are web technology-based transaction systems. The system has included order, delivery of an order, payment, order recording, and financial reporting for management. The system is made for the implementation of five main business processes that help the transaction system. The main business processes, that have created, is consisted of services, order, fulfil orders, financial services, and report for management.

1. Introduction
Industry 4.0 as a concept that emerged in recent years has become a reference for developing software. The industry concept 4.0 carries IoT, big data, artificial intelligence, and block chains have succeeded in influencing the development of information technology in the world [1,2]. As a small industry following the development of industry 4.0, it is possible. So that in order to be able to compete with other industries, a transaction system needs to be made that can reach many remote areas without being restricted to regions, islands, and even countries [3].

The retail industry that carries direct sales concepts makes it a priority in serving transactions. Market developments that are so great and online transactions that are already quite spread to make the need for a transaction system that carries the industry 4.0 concept. Daily transactions carried out must be able to be served without any restrictions. Transactions like this can only be done by carrying out the concept of online services. Web-based electronic services make it a manifestation of increasing revenue in the retail sector. Services such as ordering, fulfilling orders, payments, recording, financing, and reporting to management must be provided to increase transaction growth. The problem in this study is the provision of IoT-based transactions that must be completed. The increase technology in IoT concept and need of autonomous process of transaction are to be one problem that should to migration in the web technology. Because this research focuses on developing the web technology, the research attempts to build web application in e-transaction in order to increase the service for client. This research is limited to the process, business activities, and space. The web is only for Indonesia people who want to make food orders. This study aims to provide work steps in designing and implementing business
processes in a retail business. The contribution of this research is to make an E-transaction application based on web technology with industry 4.0 concept [4]. E-Transaction is a web based application created by the business process retail seller [5, 6].

The study is conducted with UML diagram and prototype paradigm. As a result, we described on section three. The diagram is only used to present some logical system such as class diagram, class diagram, and a part from conventional diagram is physical data design which figure out on ER-diagram. In the result, we present some pictures as a system model in the web technology. We show only partial menu like login, menu order, transaction order, and report. Every study should to make contribution in order to clear the directed research. The research contribution is to give a fast transaction system on web technology and a blue print concept about the design and implementation the software. The impact of the research, the transaction can be fast on servicing and not limited by space, distance, and time. The other impact, the business can increase the income and make wide or branch in other city.

2. Method
2.1. Data Collection
Observations are made directly to retail seller. This observation aims to facilitate researchers on the process of collecting data which will later be used as information. Objective other observing system flow transaction, management, food and beverages that are running, whether or not there is a shortage in the system [11].

Interviews are carry out by collecting data by asking questions to the cashier, the kitchen, and the owner. Another thing that is asked is the recording of transaction reports, income statements, and reports of raw materials. Data are the result of using the documentation is written by collection from company. The activity of collecting data is to analyze and study data based on existing documents. The implementation of data scheme, we put in section three [12]. The various data have collected from client such as billing data, food data, client data, officer data, order data, and validation data. We designed all of data and provided the data to make complete the need of data. We argue, every application should have the storage for recording the data in order to make report, decision, and so on in some day. The fault transaction or fraud transaction can be monitored and controlled by using the data.

2.2. Prototype
Prototype is a system development model in a cycle. The prototype has four steps in system modeling. The steps include requirement, building prototype, evaluation prototype, coding systems, test systems, evaluation system, and using the system [7]. Part of requirement is collected from the user need about business process, coloring, menu, and technology prefer. The building prototype is made small application that can be seen by client or user to make align with the aim of system. The evaluation prototype is a step for evaluation the application and make report the application what the system is fulfil the aim or still lack. If the application is lack, we can add some functions. Coding the system is one task for programming step, we created some coding with the application generator namely PHP (programming hypertext processor). Developing database system, we used MySQL. PHP and MySQL is an open source and free license. The process models will be cycle process in prototyping paradigm, until the user is convenient.

2.3. Unified Modelling Language (UML)
The developing system should have some constructing models. This research has conducted by UML to describe the models. The UML is proposed by OMG. UML is a method of analysis and design of object-based systems. UML consists of some diagrams, among others: the use of case diagram, diagram activity, sequence diagram, class diagram, object diagram, deployment diagram, and component diagram. The execution of this research only uses-case, and class diagrams [8-10].
3. Results and Discussion

3.1. System Analysis and Design

The system is designed to cover various development activities and improvements of the existing system. In this process, the researcher seeks to improvise the system that is running and designing a new system by utilizing existing computer technology and facilities to solve or overcome various problems that exist in the system that are running, so that business effectiveness and productivity can be improved.

Use-case diagram at Figure 1, to facilitate the reading program procedure [8]. Based on the analysis, it has been right in the acquired use-case diagrams and class diagrams. Figure 1 provides an overview of the E-Transaction internal system [9]. In figure out the diagram, we have to understand the business process of transaction. We analyzed the process and acquired seven processes the transaction which already have at retail. The transactions have defined in retail regulation. The retail can be own defined the process with based on the activity at day-to-day operation. We collected some processes which are identified when interview with the owner such as employee process, food repository, reimburse, purchase order, and invoice order. We added some functions to support the application and give secure on the system like report, login, and logout. The diagram presented in use case diagram that can be (seen at Figure 1 and Table 1)

![Use-case diagram E-Transaction](image)

**Figure 1.** Use-case diagram E-Transaction
Table 1. Use-case description that explain the use-case diagram

| Use-case            | Description                                                          |
|---------------------|---------------------------------------------------------------------|
| Food and Beverages Menu | Activities to manage food and beverage data available at seller     |
| Employee record     | Activities to manage human resources                                 |
| Sales Return        | Activities to handle if there is a return on sales                  |
| Sales               | Food and beverage sales business activities to consumers             |
| Logout              | Exit from E-Transaction                                             |
| Purchase            | Business activities of raw material purchases carried out by the kitchen section to suppliers |
| Report              | daily sales report recapitulation conducted by the cashier. The process of recapitulation of reports of purchases made by the kitchen. The process of recapitulation of reports of food and drinks sold by the cashier |

Explanation of the activity of the use-case diagram in Figure 1, can be seen in Table 1. Table 1 describes what is done in each case. This design is obtained from the results of analysis of requirements desired by the user. Figure 3 provides a complete analysis and system design, which is a picture of data implementation in the database management system [13]. Physical data design is derived from reading the designed class.

3.2. Implementation E-Transaction

3.2.1. GUI Interface

The specifications for software or software requirements to run this program are as follows: The minimum operating system uses Windows XP, uses XAMPP v.3.2.1 as a localhost server, uses MySQL phpMyAdmin as a database [13]. Designing network architecture is a general form of a program design to make it easier for users or users to run applications in an integrated manner. The design of network architecture must be adapted to its function so as not to experience difficulties in selecting menus [14].

The design of the interface is an interface between the user and the system that is applied through a display or interface consisting of menu structure, input design, and output design [15]. Input design is the initial design of a system process that starts from an information inputted by the user (see Table 2).

Table 2. An example black-box test on a part of E-Transaction on login form

| Testing scenario | Test Case | Expected Result | Result | Comment |
|------------------|-----------|-----------------|--------|---------|
| Input all attributes correctly then press the sign button | -Username = "admin" / "fariz" / "12345" | Enter the dashboard menu according to the account status | Display the dashboard menu according to the status of the account | Valid |
| Input all attributes correctly then press the submit button | -Username = "rizki" / "ramadhan" / "cashier" | Save new user data into the database | Displays a message that new data has been entered | Valid |

3.2.2. Software Testing

The test plan is a very crucial stage in program development. Tests are conducted to ensure the quality of applications that have been made [16]. The purpose of this test is to ensure that the application made is of good quality. Another purpose in this test is that the application runs properly without experiencing interference and allows it to be developed again. Testing this application uses the black box testing method [17]. Table 2 is an example of testing carried out on E-Transaction. In
testing this application, researchers used the equivalence partitioning method which is the right test case to reveal errors in the programs made.

4. Conclusion

After discussing e-Transaction thoroughly, we conclude that: an E-Transaction application can be used to help day-to-day operation. The system is made for five main business processes that help the transaction system. The main business processes, we have created, are shared services, orders, fulfilled orders, financial services, and report for management. The impact of such systems as time of service, order, payment, and timely reporting can be compared without the use of web technology. The real-time process provided by businesses quickly makes decisions on transactions. Further development of E-Transaction is to add the mobile application feature, so that it is user-friendly. This is done as a proposal because of the technology of Industry 4.0 which has been able to adopt mobile technology.

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