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Implementation of the First Come First Served Algorithm in the Futsal Field Booking Application using Extreme Programming

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ABSTRACT

This research is related to the development of an Android-based futsal field booking application at Laut Dendang Futsal using the First Come First Serve (FCFS) method. Currently, tenants are facing problems with booking futsal fields, especially because the booking process is still manual and time consuming at Laut Dendang Futsal. Ordering systems that do not use information technology cause customers to have to visit the location directly to order the field. The FCFS method is applied to arrange a futsal field booking schedule based on order of arrival, where requests that arrive first will be served first. This research builds an Android-based application with the aim of increasing efficiency in booking management and futsal field scheduling. The development approach used is the Extreme Programming method, which includes planning, design, coding and continuous testing. The results of application development show good performance in minimizing ordering errors and making it easy for Laut Dendang Futsal customers to order fields without having to come directly to the location. Admin can easily manage and record orders, avoiding errors in the ordering system. Thus, this research makes a positive contribution in increasing the efficiency of booking futsal fields, as well as speeding up responses to incidents.

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1. INTRODUCTION

The futsal field rental business is currently growing increasingly rapidly [1]. The field reservation problem is quite a dilemma for all sports field tenants [2]. The current booking system at Laut Dendang Futsal still requires a lot of time to carry out the field booking process because anyone who wants to book a field must come directly to Laut Dendang Futsal. Laut Dendang Futsal Field is one of the futsal fields in Medan City which does not yet have an online ordering information system. If you want to order a futsal field, the customer must come to the location and then the cashier records the order in a notebook. Upon arrival at the location, the customer will not necessarily get the appropriate field schedule. the hours they want, this often happens because the futsal field still does not use a computerized application system [3].

The First Come First Served method is the method applied in this ordering application [4]. FCFS is a process scheduling algorithm. Requests that come first will be executed first [5]. The algorithm First Come First Served is a scheduling queuing system where prioritization of processes that input first will be served first. The First Come First Served method prioritizes larger priorities over smaller priorities, but this can

happen when processes have the same priority, so the process is carried out in the scheduling that appears first [6].

Similar research with the title Implementation of the First Come First Served and Haversine Algorithms in Mobile-Based Food Ordering Applications. The research results show that it can provide time and employee efficiency to business owners so they are able to maintain their business during the Covid-19 virus outbreak and provide convenience to customers because they can monitor orders without having to leave the house. Previous research entitled Comparative Analysis of First Come First Served and Round Robbin CPU Scheduling Algorithms. From the results of this research, the findings indicate that the algorithm First Come First Serve outperforms the Round Robin (RR) algorithm. This superiority is evidenced by the more effective average Turn Around Time, Waiting Time, and Throughput values observed in the implementation of the FCFS algorithm during the process [7].

Another research entitled Application of the First Come First Served Method in the Campus Asset Maintenance and Repair Service Information System. This research discusses the Information System for Maintenance and Repair of Campus Assets which will be implemented by the Cilacap State Polytechnic's repair and care maintenance unit (UP3). In this system, the First Come First Served method will be used which functions to prepare maintenance and repair schedules for campus assets which are sequenced according to the proposed entry time (based on arrival time)[8].

Different from research that has been conducted previously. In this research, an Android-based futsal field ordering application will be built so that futsal field ordering and scheduling can be managed better than before. This system uses the First Come First Serve method which functions to compile booking schedules and futsal field information which is sorted according to the proposed entry time (based on arrival time), and this research uses the development of the Extreme Programming system. In this way, the futsal field ordering and scheduling process becomes more organized and the response time for handling incidents becomes faster.

2. RESEARCH METHODE

2.1. Method of Collecting Data

The author used the following methods to collect data for this study:

a. Observation

Observations were carried out by visiting the location of the research object in the Laut Dendang Futsal, by directly observing the activities currently taking place. The purpose of conducting observations is to see and find out how far the system is running and see what problems occur with the research object.

b. Interview

Interviews were conducted to collect data and information related to the research object. The researcher sought data through the owner and cashier of the futsal field. Interviews were conducted with the aim of finding out the problems and obstacles that occur in the field.

c. Literature Review

This method is carried out by searching for several literatures and journals which can be seen within the reference list of this research document, books related to the research topic taken, as well as studying theories related to previous research.

2.2. System Development Method

This research uses the Extreme Programming application development method. The Extreme Programming method is a development method that uses an object-oriented approach to agile development software. Planning, design, coding, and testing [9].

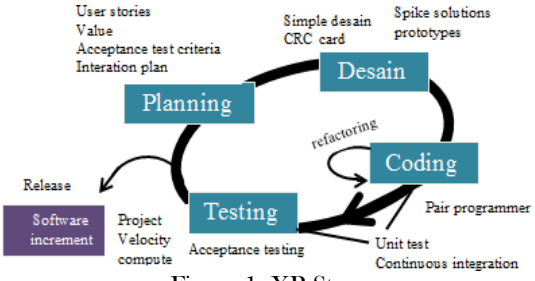

Figure 1. XP Stage

3. RESULT AND ANALYSIS

Fist Come First Served Scheduling Conditions are according to the arrival time or (Arival Time) and executed during the required time, namely (Burst Time).

Table 1. Example of First Come First Served Calculation Process

Proses	Arrival Time	Burst Time
P1	0	5
P2	2	8
P3	4	3

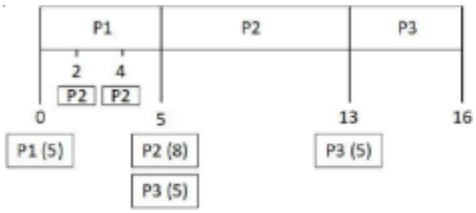

Figure 2. Gantt Chart

The way it works is that the Gantt Chart image functions to illustrate the process flow when it is executed, first starting from number 0, namely (Burst Time) or the arrival time of P1, then P1 is executed first, when P1 is being executed then P2 arrives at time 2 and P3 comes at time 4, so the execution process of P1 is 5 because P1 requires an execution time (Burst Time) of 5, when P1 is being executed there are no other processes that will interfere. When P1 has finished executing at time 5 then there are P2 and P3 in the queue. After that, the next process is to execute the process that came first, namely P2 with an arrival time of 2, because P2 takes 8 times, so if it starts at time 5 it will end at time 13. After P2 is executed then next is P3 with an arrival time of 4 and executed at time 13. After P2 is executed then it ends at time 16 because P3 only takes 3 times because if P3 is executed at time 13 then it ends at time 16.

The next step is to calculate the average waiting time, which is the execution time minus the arrival time, namely P1 = (0 – 0) = 0, P2 = (5 - 2) = 3, P3 = (13 – 4) = 9 so (0 + 3 + 9) = 12 is the average time just wait.

3.2. Use Case Diagram

Use case work by describing typical interactions between admins and users of a system and the system itself through a diagram of how a system is used [10].

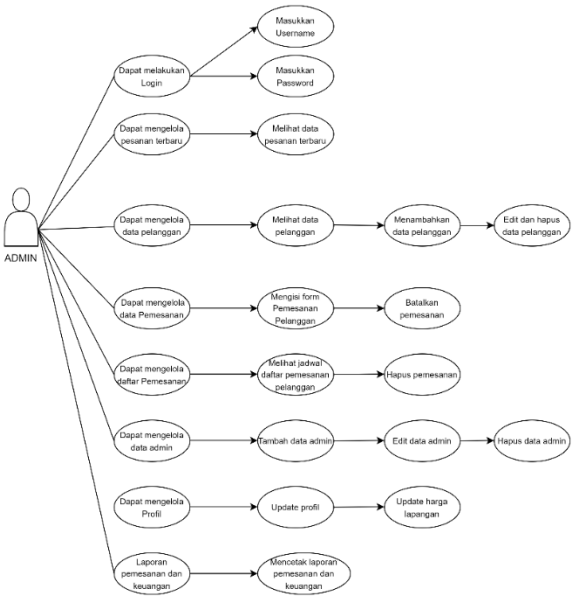

Figure 3. Use Case Diagram Admin

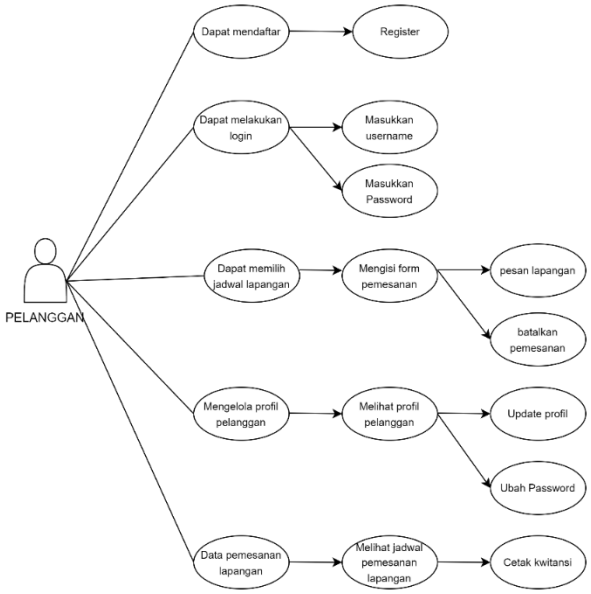

Figure 4. Use Case Diagram User

3.3. Activity Diagram

Creating activity diagrams at the beginning of process modeling can help understand the entire process [11].

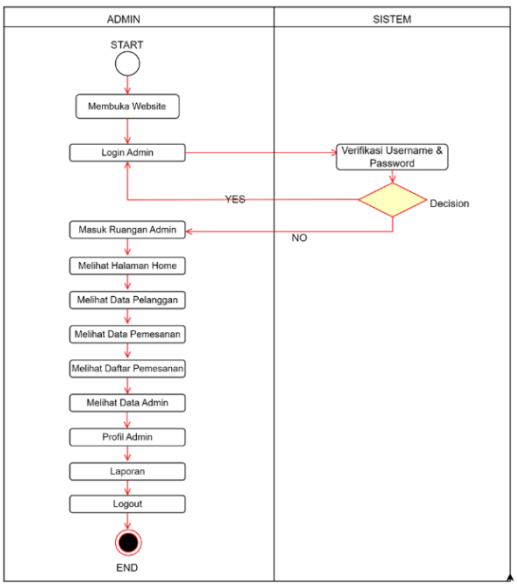

Figure 5. Activity Diagram Admin

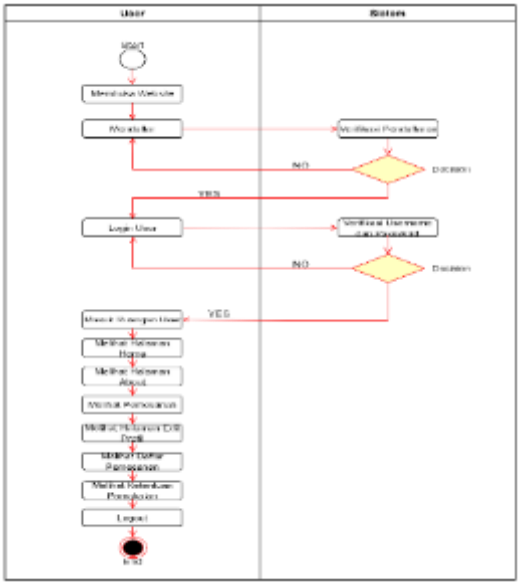

Figure 6. Activity Diagram User

3.4. Testing

Testing can mean the process of checking whether a piece of software has been produced can be executed according to certain standards. Method testing is a way or technique to test software, has mechanisms for determine test data that can test the software completely and has a high probability to find errors [12]. Testing used in Futsal field booking application accessible through a web platform. laut dendang futsal is a testing method Black Box [13].

3.5. Application Page Implementation

Admin Login Page

Before going to the main page, enter your username and password on the login page to be able to log in to your registered account.

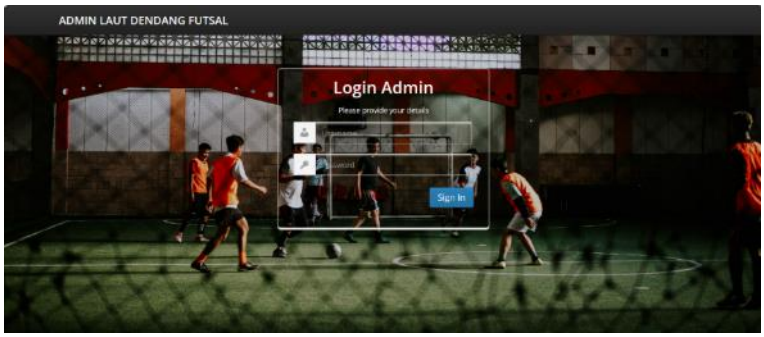

Figure 7. Admin Login Page

Admin Home Page

The Home menu is the first thing that appears when you log in successfully

Figure 8. Admin Home Page

Recent Order Pages

On this page the admin can see newly entered orders, then the admin can confirm or delete customer orders.

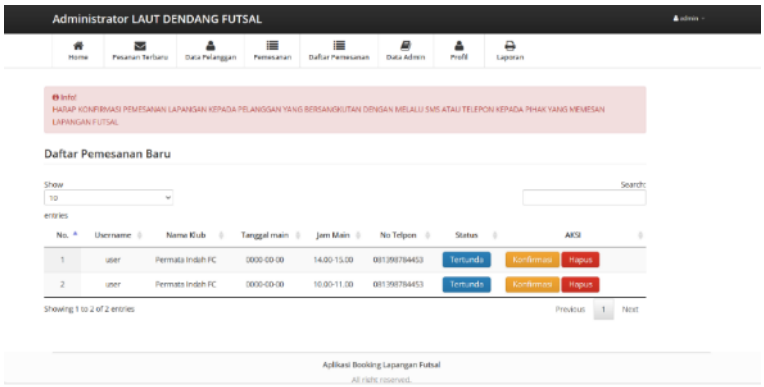

Figure 9. Recent Orders Page

Costumer Data Page

Customers can create an account via the admin, then the admin can edit and delete registered customer data.

Figure 10. Customer Data Page

Admin Order Page

On this page the admin can make orders by setting the date and schedule according to customer requests.

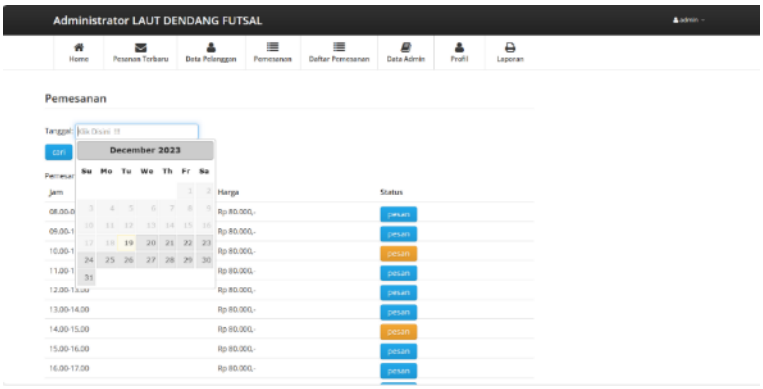

Figure 11. Admin Order Page

Order List Page

When a customer has placed an order, the admin can see whether the customer has paid in full, if not, the customer can pay in full through the admin.

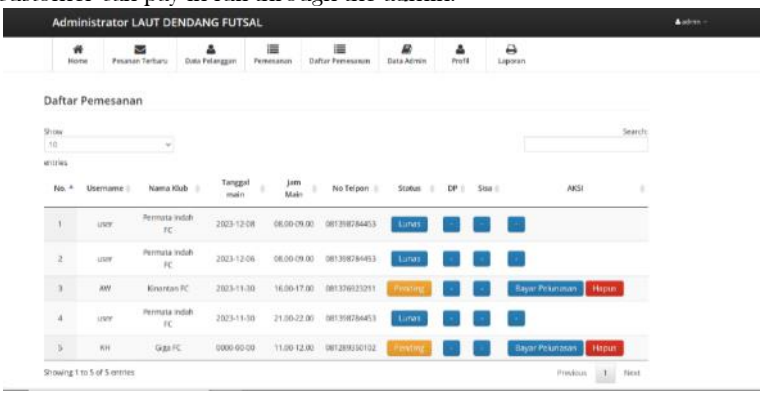

Figure 12. Order List Page

Data Admin Page

On this page the admin can add, delete and edit admin data

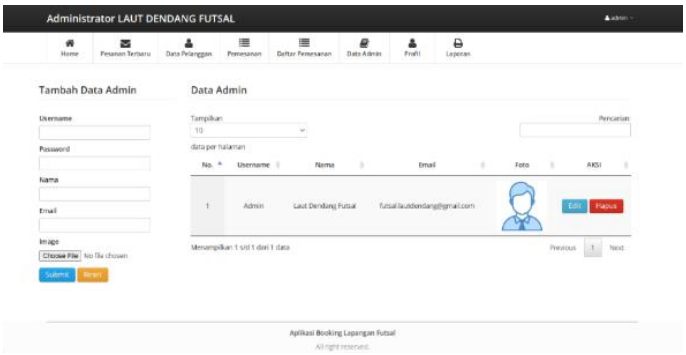

Figure 13. Admin Data Page

Profil

This page can function to change existing profile data in the admin such as futsal name, address, postal code, telephone number, prices, regulations, etc.

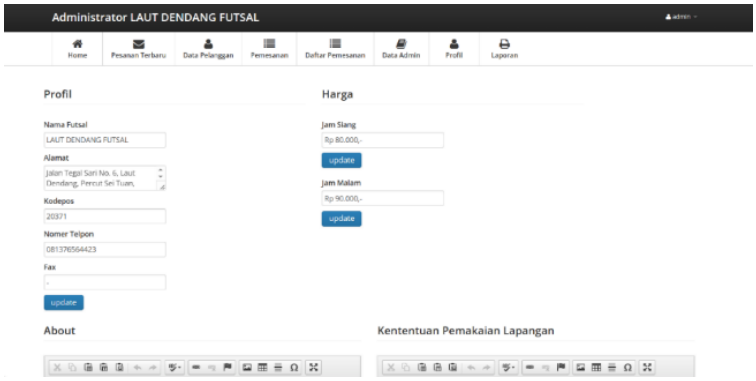

Figure 14. Admin Profile Page

Print Order and Financial Reports

After the customer has successfully placed an order and it has been approved by the admin, the admin can then print the order and financial report

Figure 15. Print Order and Financial Reports

User Login Page

Before going to the main page, enter your username and password on the login page to be able to log in to your registered account.

Figure 16. User Login Page

User Home Page

After successfully logging in, the user is directed to the home menu display.

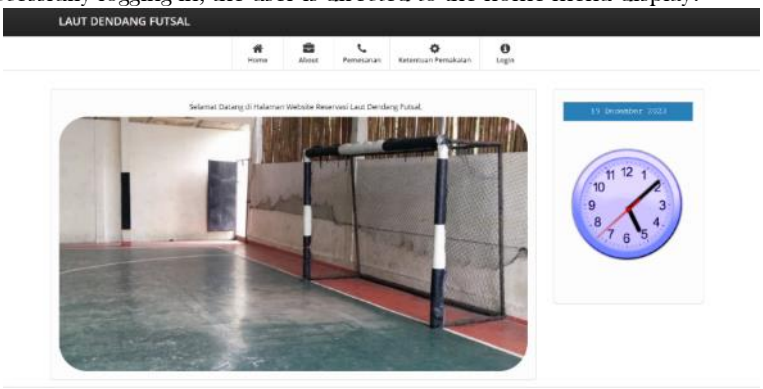

Figure 17. User Home Page

User About Page

This page displays the profile of the futsal field.

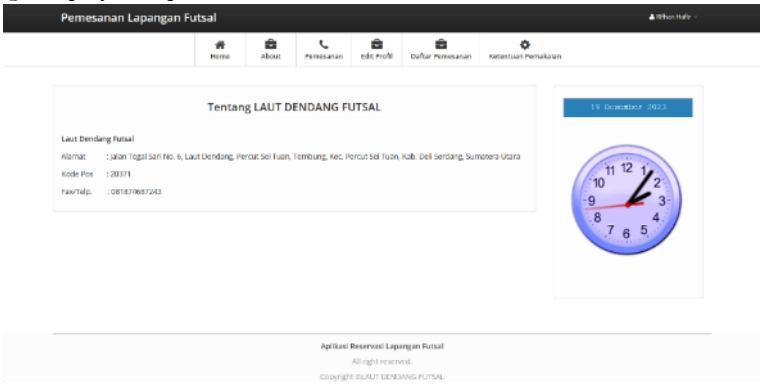

Figure 18. User About Page

User Order Page

On the booking page, customers can see the available schedule and customers can choose to book according to the desired time.

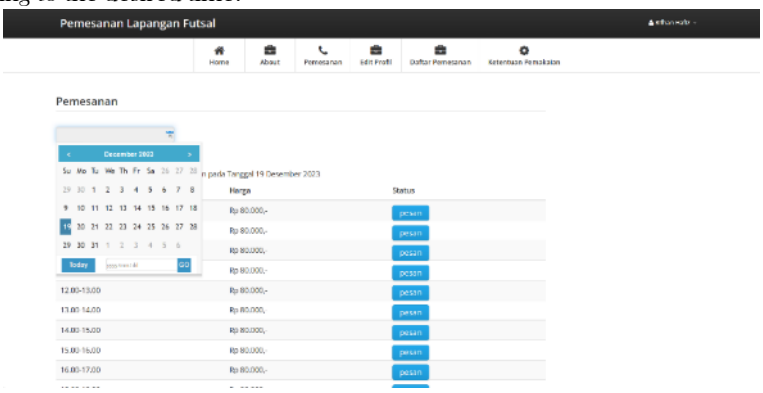

Figure 19. User Order Page

Edit Customer Data

Customers can edit data in the form of name, address and telephone.

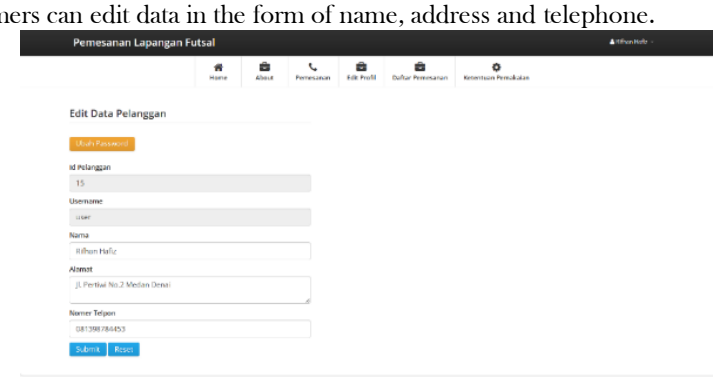

Figure 20. Edit Customer Data

Order List Page

On this page, customers can see a list of field reservations that have been ordered by other people with the status fully paid.

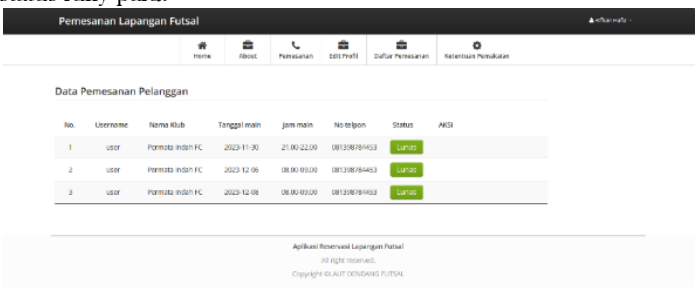

Figure 21. Order List Page

4. CONCLUSION

The results of designing a web-based ordering application at the Laut Dendang futsal field using the first come first served method are good enough to minimize errors in ordering, and it can be concluded that this application can make it easier for customers at Laut Dendang futsal to make orders without having to go to the location to looking at the field availability schedule and the information that has been recorded in the application, this application is well designed so that the admin can manage and record orders so as to avoid errors in the ordering system.

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