

## Design and construction of gym angkasa management website system in margoyoso village to improve customer service

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### ABSTRACT

This study aims to design and implement a website-based gym management system at Angkasa Gym located in Margoyoso Village to improve customer service and operational efficiency. The current system is still manual, resulting in inefficiency and risk of errors in managing member registration, scheduling training sessions, and financial transactions. The proposed system is developed using the Waterfall model with stages of needs analysis, system design, implementation, testing, and maintenance. The Laravel framework was chosen because it supports the development of modern and secure web applications. The final system has key features such as user registration and login, trainer management, transaction processing, and review submission. Based on black box testing, all system functionality runs as expected. The results of the study indicate that the web-based system is able to significantly improve gym operational efficiency and improve user service experience. This study can be the basis for further development, such as automatic notifications, implemented in other gyms, and adaptation to the mobile application version.

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## 1. INTRODUCTION

Gym is a form of business in the fitness sector that provides sports services and facilities for the wider community. This business is managed professionally with a commercial orientation and is supported by various facilities such as exercise equipment, fitness instructors, weightlifting classes, consulting services, and other supporting facilities that aim to support a healthy lifestyle. As public awareness of the importance of health increases, the need for efficient and professional fitness services is also increasing[1]. However, the Angkasa Gym located in Margoyoso Village is still running its operational processes conventionally without utilizing a digital-based management system[2]. All activities such as member registration, scheduling training sessions, and financial recording are still done manually, which not only reduces work efficiency, but also increases the risk of errors in data management and hinders more professional business development[3]. This condition shows the importance of modernizing operational systems through the use of appropriate information technology that is appropriate to local needs[4].

Several previous studies have shown the effectiveness of implementing technology in gym operations. Research by Koloay et al. (2020) developed an Android application to provide self-training guidance at Popeye Gym Suwaan, as a solution to the limitations of personal trainer services[1]. Then, Sari and Alfarisi (2024) replaced the manual membership system by building a web-based membership system for One-R Gym[5]. Afrizal and Atmaja (2025) optimized Danker Gym by designing an automatic FIFO-based training scheduling system[6]. Other studies also focused on the Laras Gym rental transaction system[7] and the financial accounting system at Tiger Gym[8], which specifically manages various aspects of gym management digitally.

This study offers a more comprehensive approach by designing a gym management website system that encapsulates various important aspects in one unit, such as member registration, training session scheduling, and financial transaction recording[9]. The system will be designed using the Laravel framework that supports the creation of modern and efficient web applications. The development of this research uses the Waterfall method which has stages of needs analysis, system design, implementation, testing, and maintenance. In addition, to support the system design, the UML (Unified Modeling Language) diagram will be used as a visualization tool and system flow, such as use case diagrams, activity diagrams, and class diagrams. Thus, the designed system is expected to be able to help overcome various operational problems faced by Gym Angkasa as a whole, as well as being the first step in implementing digital technology in fitness centers located in rural areas[10].

This study is not like previous studies that prioritize only one aspect such as collection, scheduling, or finance separately. This study emphasizes more on an integrated approach in a web-based gym management system that covers all major operational processes such as member registration, trainer scheduling, financial transactions. In addition, this system is specifically designed for rural contexts such as Margoyoso, which has not fully implemented digital technology in fitness services. Thus, this study aims to overcome the limitations of digitalization in rural areas and also provide technical solutions that make it a new contribution to the development of a web-based gym management system.

## 2. METHOD

In this study, the author uses a descriptive method with a qualitative approach as the main foundation. The descriptive method is used to describe and explain real conditions systematically, objectively, and factually. This approach aims to obtain a logical and in-depth picture of the problems that occur at Angkasa Gym, especially in terms of service management and user needs. The research strategy is carried out in two stages, namely the data collection stage and the software development stage[10].

### Data Collection

This study uses a qualitative approach to understand customer needs and constraints in service management at Angkasa Gym. Data were collected through interviews, observations, and documentation studies of the gym management system. This approach aims to provide insight to improve the management and service system according to user needs[11]. Data collection methods used include:

#### *Observation*

Conducted directly at Angkasa Gym to understand the service flow, user needs, and existing problems as a basis for system development.

#### *Literature review*

Reviewing literature such as books, journals, and research related to gym management systems to strengthen the theoretical basis.

#### *Interview*

Conducted with the admin or owner of Angkasa Gym to obtain in-depth information regarding system operations and needs[12]. This interview involved two admins including administrative staff, operational staff and also the owner of Angkasa Gym.

### Software Development Methods

The Waterfall method is used in the development of Angkasa Gym's information system, where each stage is carried out sequentially, starting from needs analysis, system design, implementation, testing, to maintenance. Each stage must be completed before proceeding to the next stage[13].

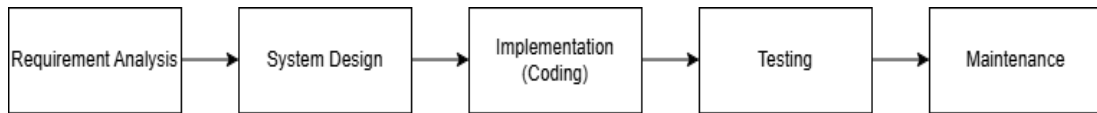


Figure 1. Waterfall method

The image above is the method used in designing a website-based gym management application. The development of information systems at Angkasa Gym applies the Waterfall method which is divided into five structured stages, namely:

#### **Requirement analysis**

At this stage, identification of system needs, both functional and non-functional, is carried out based on literature studies, observations and interviews with Angkasa Gym owners and staff. The results are in the form of system requirements specifications which are the main reference in the design stage.

#### **System design**

Based on the analysis results, a system structure, user interface display, and system workflow were designed that were adjusted to Angkasa Gym's business processes and operational needs.

#### **Implementation**

The design that has been prepared is then developed into program code using the PHP programming language, Laravel Framework, MySQL Database, Laragon, and CSS.

#### **Testing**

The completed application is tested to ensure all functions work correctly and meet specifications, including important features such as member data recording, schedule management, and payment systems.

#### **Maintenance**

After the system is implemented, periodic maintenance is carried out to correct technical errors and adjust the system if there are changes in needs, so that system performance remains optimal.

### **3. RESULTS AND DISCUSSIONS**

#### **Requirement Analysis**

In developing the Angkasa Gym management system, identification of system requirements is carried out to ensure that the application built is in accordance with business processes and supports service improvements.

Table 1. Website features

<b>Role</b>	<b>Feature</b>
Admin	View admin dashboard
	Manage trainer categories
	Manage trainers
	View and manage trainer transactions
	Manage user reviews
	View and print sales reports
	Add and edit expense data
Print PDF reports	
Member	Register and login user accounts
	Verify user emails
	View homepage and venue information
	Add trainers to shopping cart
	Checkout process
	View and check order history
	Leave reviews on trainers
Manage user profiles	

The table above is an explanation of the features on the website that can be used by admins and gym members.

#### **Design**

##### **Use case diagram**

The use case diagram in the Angkasa Gym system describes the relationship between users such as admins and members and the main functions of the system they use [14].

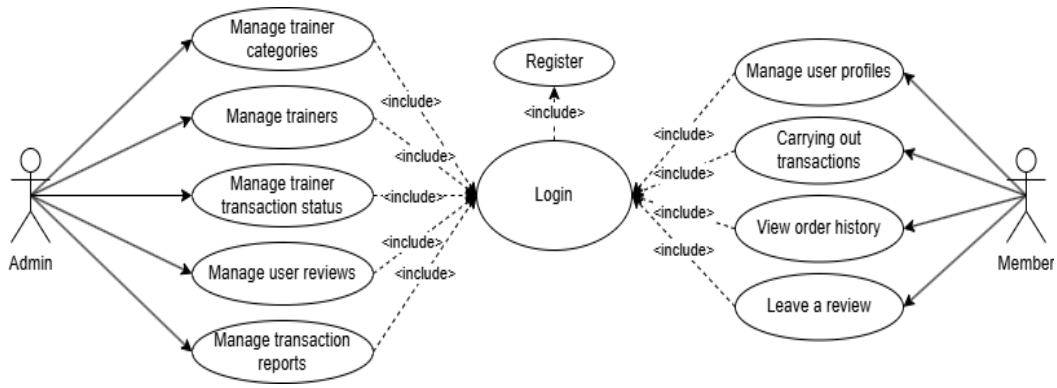


Figure 2. Use case diagram

The image above is a relationship between user features on the website that can be used by admins and gym members in the form of a use case diagram.

**Activity diagram**

1. Process of adding trainers (Admin)

This activity diagram illustrates the process flow of adding trainer data by the admin through the Trainer menu in the Angkasa Gym management system. This diagram explains the steps of the activity from the beginning until the trainer data is successfully saved into the system[15].

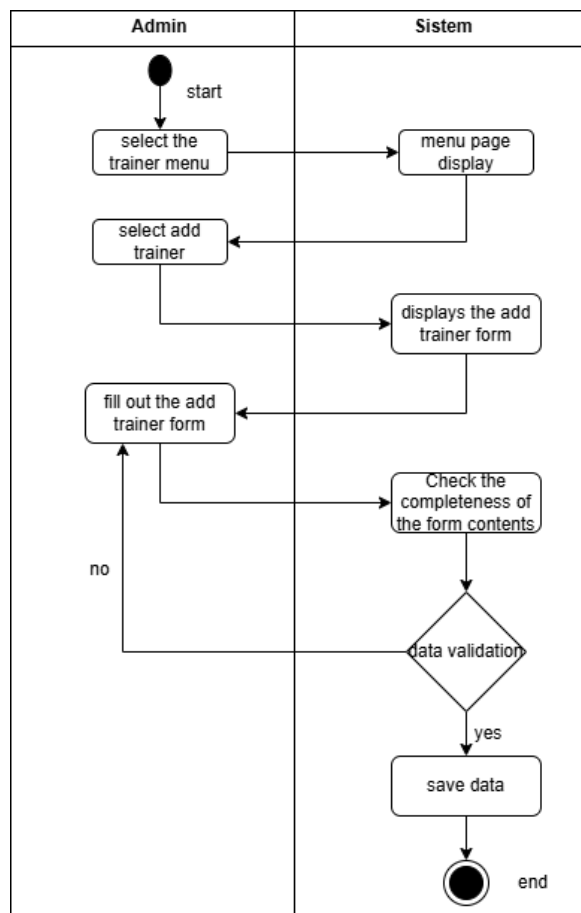


Figure 3. Activity diagram trainer menu

The image above explains the complete flow of admin activities in adding trainer data and displaying it on the website.

## 2. Checkout process and give trainer reviews (Member)

This activity diagram illustrates the trainer checkout process flow carried out by members through the Angkasa Gym system. This diagram explains the stages of interaction starting from selecting a trainer to completing the checkout process and providing a review of the trainer, then the transaction data is recorded in the system.

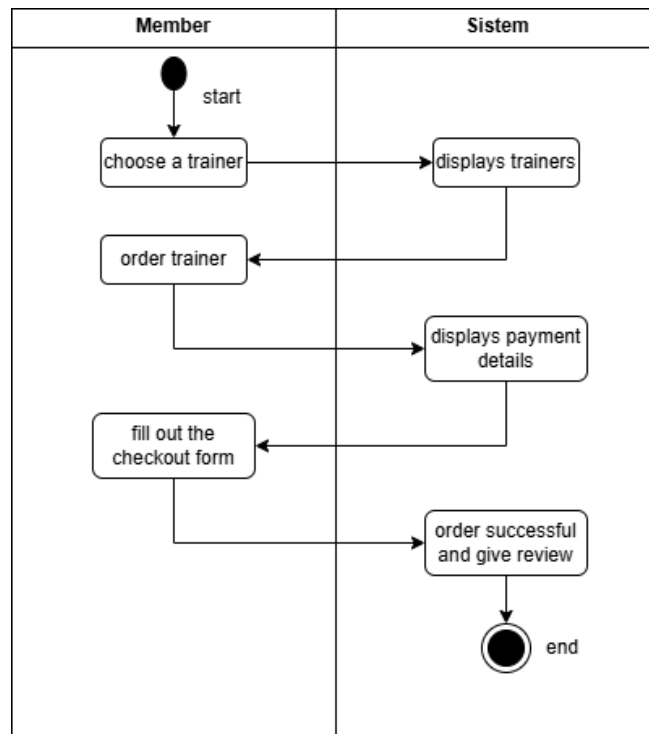


Figure 4. Activity diagram checkout trainer

The image above explains the flow of members selecting and reviewing trainers.

### **Sequence diagram**

#### 1. Add trainer (Admin)

This sequence diagram illustrates the interaction between the admin and the system when adding trainer data through the Trainer menu on the Angkasa Gym system. This diagram shows the sequence of messages sent between objects from the beginning of data input until the trainer data is successfully saved into the database[16].

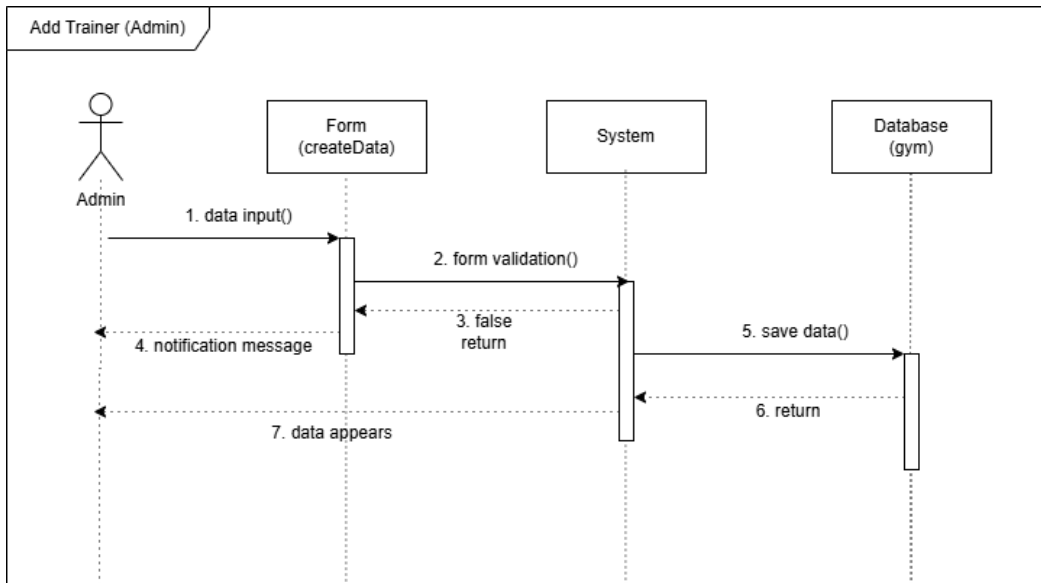


Figure 5. Sequence diagram add trainer

The image above illustrates when the admin adds trainer data to the system and the system saves the data to the database.

2. Checkout trainer (Member)

This sequence diagram illustrates the interaction between members and the system in the trainer checkout process on the Angkasa Gym system. This diagram shows the sequence of messages from selecting a trainer to a successful checkout transaction being recorded in the system.

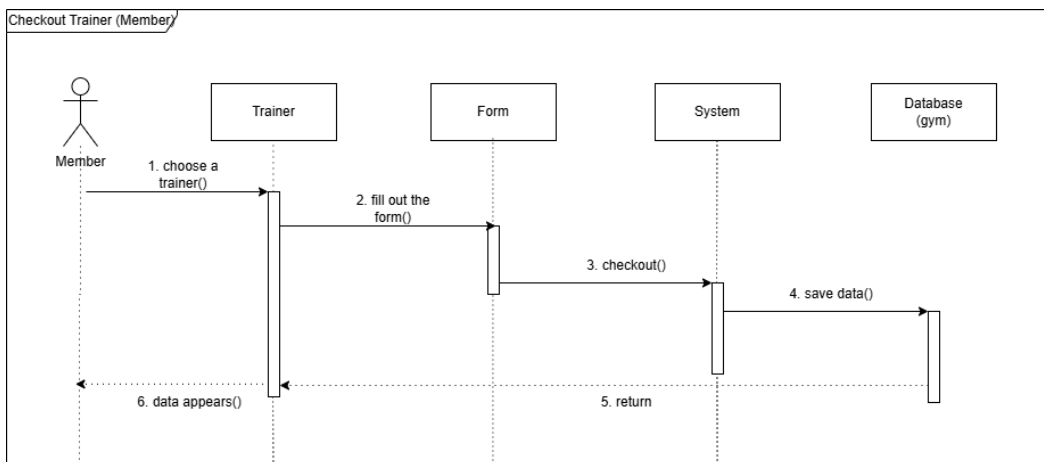


Figure 6. Sequence diagram checkout trainer

The image above is an illustration of members when selecting a coach and the data is stored in the database.

**Class diagram**

Class diagrams in the Angkasa Gym system are used to statically model the system structure, which includes the main classes along with attributes and relationships between classes. This diagram provides an overview of the database design and programming logic underlying the gym management system[17]. Here is the class diagram from Angkasa Gym:

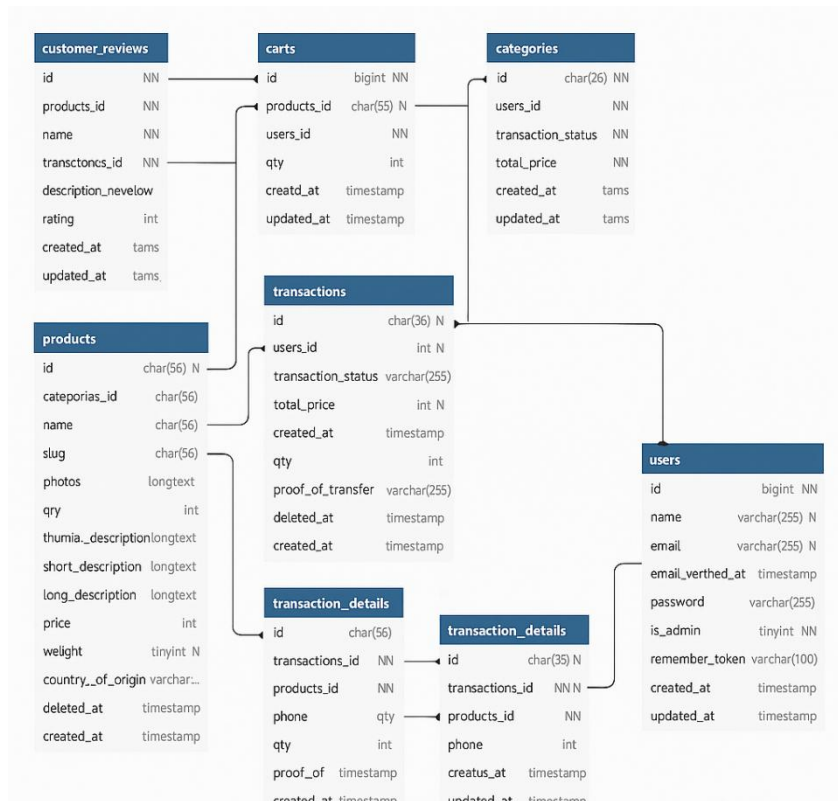


Figure 7. Class diagram

The diagram above explains the relationship between classes and their attributes in the gym management website application.

**Implementation**

**Login**

The login page functions as the user's initial access to access the system, the user must enter a valid email and password, such as admin or member.

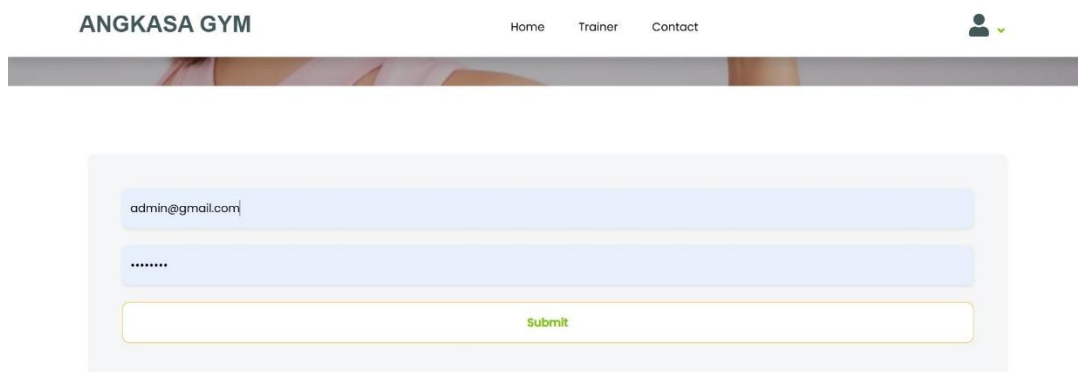


Figure 8. Login page

**Add trainer menu**

This menu is used by the admin to add or edit trainer data into the system which will be saved and displayed on the trainer list.

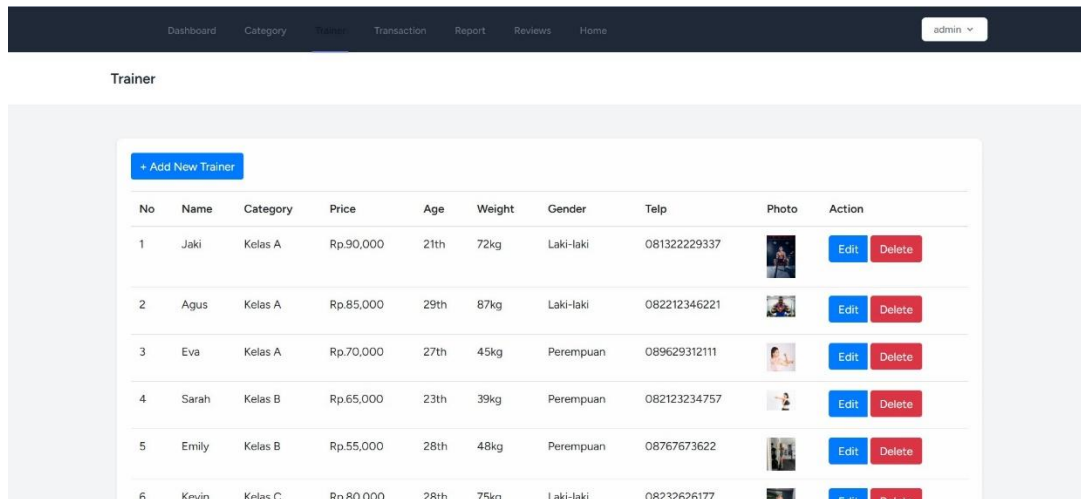


Figure 9. Trainer menu

### Checkout

This feature is used by members to make trainer reservations. Members select trainers, fill in the required data, and save transaction data into the system.

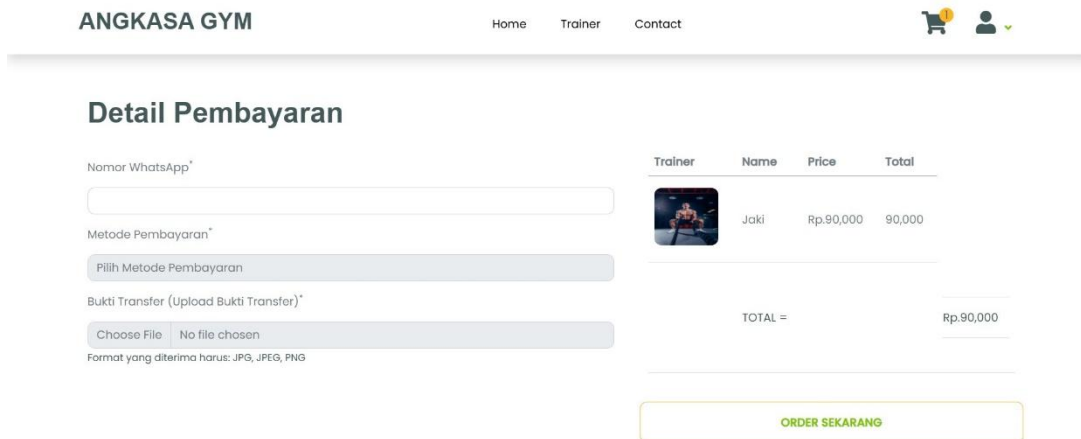


Figure 10. Checkout trainer

### Review

In this feature, members can give reviews to trainers after a training session. The system will display comments as a reference for other members in choosing a trainer.

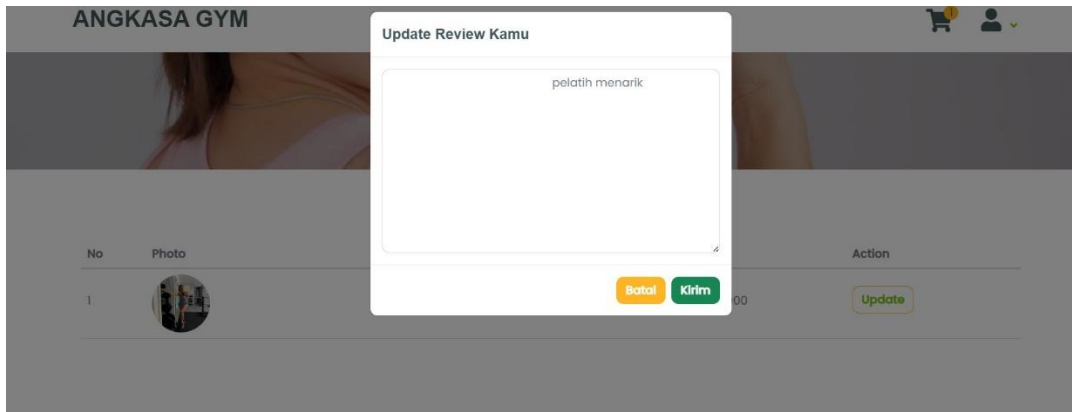


Figure 11. Member reviews

**Data security**

The data security of the website-based gym management system developed in this study has been designed by considering the basic principles of personal information protection.

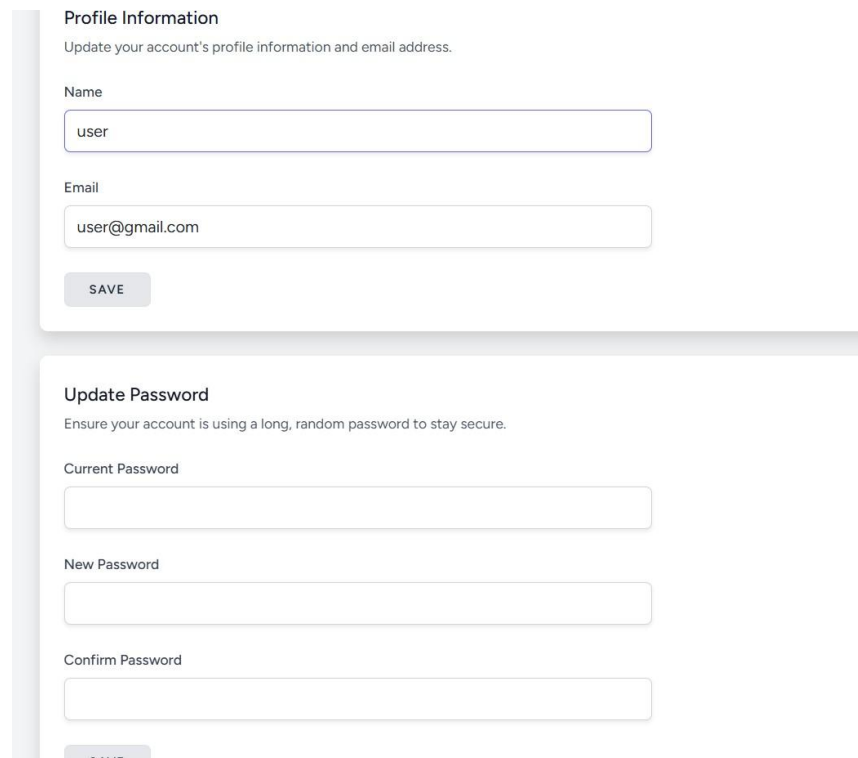


Figure 12. Data security

The image above shows that this system implements the separation of access rights between admin and members to prevent administrative feature protection. Laravel's built-in hashing algorithm is used for the authentication process through email verification and the use of encrypted passwords. Then the system is designed to be further developed with backup features and periodic maintenance that support operational continuity.

**Testing**

The testing of Angkasa Gym website system application is done using the black box method. This testing is used to ensure that each feature functions properly and in accordance with the previously set input and output configuration[18].

Table 2. Blackbox testing results

No.	Testing	Information	Status
1	Login	The user successfully logged into the system after entering valid data.	Succeed

2	Logout	The user was successfully logged out of the system and redirected back to the login page.	Succeed
3	Admin profile page	Admin profile information is displayed correctly according to the stored data.	Succeed
4	Admin category menu	Admin can access and manage categories properly.	Succeed
5	Checkout	Members can make trainer reservations and transaction data is stored.	Succeed
6	Leave a review	Member successfully submitted review and system displays it correctly.	Succeed
7	Manage trainers	Admin can add, edit and delete trainer data.	Succeed
8	Manage transaction reports	Admin can view and manage complete transaction report data.	Succeed
9	Manage reviews	Admin can view and delete reviews from members.	Succeed
10	Contact page	Contact information is displayed correctly and is easily accessible to users.	Succeed
11	Member transaction history page	Members can view personal transaction history with appropriate details.	Succeed

The next stage of testing is the User Acceptance Test (UAT) which aims to check whether the gym management website system at Angkasa Gym has met the needs desired by users. UAT testing is carried out by involving end users to evaluate the main features such as member registration, schedule management, and recording of financial transactions running as expected and ready to be used in operational activities. The weighting in the assessment refers to the Likert scale formula, and the calculation results are obtained by Equation (1).

$$Index \% = \frac{Total\ score}{Score\ max} \times 100 \quad (1)$$

The UAT testing involved respondents from members totaling 20 people as system testing. Respondents in this test answered the prepared questionnaire. This testing method uses a Likert scale approach that has 5 assessment options[19]. The summary of the final results of User Acceptance Testing (UAT) is shown in the following table:

Table 3. User Acceptance Test (UAT) answer value weight

Answer choices	Value weight
Strongly agree	5
Agree	4
Neutral	3
Don't agree	2
Strongly disagree	1

Table 4. UAT test results

No.	Question	Score					Total
		SA (5)	A (4)	N (3)	DA (2)	SD (1)	
1.	Is the system interface easy to understand and use?	12	8				92
2	Does the member registration process through the system run smoothly and according to requirements?	13	7				93
3	Does the ordering/trainer selection feature through the checkout process meet your expectations?	11	9				91
4	Do you find the trainer review feature helpful in choosing a training service?	10	10				90
5	Does the system record and display your transaction history completely and accurately?	12	8				92

6	Do you feel that this system makes it easier to do activities in the gym compared to the previous manual system?	15	5	95
Total score				553
Percentage				92%

The table above is a summary of the results of the system test involving respondents from members totaling 20 people as system testers. Respondents in this test answered the prepared questionnaire. The total score is obtained by adding up the answer scores multiplied by the Likert scale weight. To obtain the percentage, the first step is to determine the total score, which is 5 (the highest weight) multiplied by the number of questions (6), so that a score of 30 is obtained. The maximum score is then obtained from the total score multiplied by the number of respondents, which is  $30 \times 20 = 600$ . The percentage is calculated using equation (1),  $\text{total score} \div \text{maximum score} \times 100$ , which is  $(553 \div 600 \times 100 = 92.2\%)$ . So the percentage of gym management system website applications is 92.2%.

Table 5. Likert scale percentage criteria

Percentage		Information
100%	80%-	Strongly agree
	60%-79%	Agree
	40%-59%	Neutral
	20%-39%	Don't agree
	0%-19%	Strongly disagree

Referring to the criteria table above, the gym management website system application has a percentage of 92.2% (strongly agree) which shows that this application is suitable for use.

Operational efficiency and user experience at Angkasa Gym have been successfully improved with this system despite having several limitations. The first limitation is that this system is not yet available in a mobile version and has only been developed in a website version. Both applications do not yet have automatic notifications as a reminder of the training schedule. Finally, this system is still limited to being implemented in only one location, namely Angkasa Gym in Margoyoso village, so its effectiveness cannot yet be applied to other gym locations, especially for those with different scales or operational needs.

#### 4. CONCLUSION

The results of the research and implementation of the website-based management system at Angkasa Gym can be concluded that the system runs well and is proven to be effective in supporting operations such as member registration, managing training schedules, and recording financial transactions. This system supports more efficient management, minimizes errors from manual processes, and facilitates interaction between management and users. The use of the Waterfall method reflects systematic and structured work stages, so that the resulting application is stable and meets user expectations. Based on the results of black box testing, the features built run as they should and are in accordance with user needs. However, this study still faces several limitations. As a suggestion for further research, system development can be directed at adding automatic notification features for training schedules, and the system can be implemented at other gym locations with diverse operational needs. In addition, the development of a mobile version of the application also has the potential to expand the reach of services and improve user convenience.

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