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Design of a Web-Based Air Conditioner Service Information System Using the Fifo (first in first out) Method: A Case Study at PT. Top Airconditioner

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Abstract - PT. Top Airconditioner is one of the companies engaged in AC service and air conditioning providers located at Permata Tangerang Blok DA No.11. PT. Top Airconditioner already has a website that contains information about PT. Top Airconditioner, the types of AC service services available along with their prices, but do not have a special website that functions for booking AC service services because currently the process of booking AC service services is still using WhatsApp media. The system that is currently running is not running well because there is still a problem, namely there is no media to store AC service booking request data because currently the request is made using WhatsApp media so that data is vulnerable to being lost and AC repair reports have not been properly documented because the data of the repair results is only recorded using a book. This study uses the PIECES analysis method, RAD development, UML design, and system testing using blakbox testing. This research results in an ac service system that is built using Java, spring boot, for the Front End using react js postgreSql database and its deployment using google cloud platform.

Keywords:
Service;
Service AC;
RAD;
Java;
Spring Boot;
PostgreSQL;

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1. INTRODUCTION

The rapid advancement in the fields of computer, electronic, telecommunication, and mechanical technologies has resulted in the emergence of sophisticated and intelligent applications that are transforming human life now and in the future. Along with this technological development, the role of information and communication technology has had a significantly positive impact on improving human quality of life. Moreover, technological advancements also help accelerate and simplify work processes.

PT. Top Airconditioner is a company engaged in air conditioner service and AC supply, located at Permata Tangerang, Block DA No.11. The company already has a website containing information about PT. Top Airconditioner, the types of AC service offerings available, and their respective prices. However, it does not yet have a dedicated website for booking AC service appointments, as the current booking process is still done through WhatsApp.

The current system in place is not operating optimally due to several issues. Service records are still manually documented using basic Microsoft Office applications, meaning the data management process is not yet automated. As a result, it takes a full day to prepare service reports, and those reports are still created using Microsoft Excel, often leading to data entry errors and unclear documentation.

Based on the existing issues at PT. Top Airconditioner, there is a need for an information system for AC service operations aimed at improving customer service and making it easier for employees to store AC service data. Therefore, the author intends to address this issue in a thesis research project titled **"**

2. THEORETICAL FOUNDATION

2.1 General Theory

1. According to Riyanto in the journal by Tiara Rahmasari (2019:413), “Design is a stage that must be carried out before the creation and implementation of an application.”
2. In the journal by Henderi (2020), design is defined as “a stage in the development of an information system to solve problems.”. Based on the above definitions, the researcher concludes that design is a primary activity carried out before creating an application, intended to solve problems.
3. According to Susanto in the journal by Putri Aini, Iwan Purnama, Deci Irmayani, et al. (2020:31), “A

system in an institution aims to control the activities within the institution." A system is "a group of subsystems/parts/components, both physical and non-physical, that are interconnected and work harmoniously to achieve a specific goal."

4. According to Jogiyanto in the same journal (2020:31), "A system is a network of interrelated procedures that come together to perform an activity or achieve a specific objective."
5. According to Ricard F. Neuschel in the journal by Henderi and Padeli (2019), a system is "a sequence of clerical operations (writing activities), usually involving several individuals within one or more departments, implemented to ensure consistent handling of business transactions."
6. According to Kusrini and Koniyo in the journal by Alfriza Frisdayanti (2019:63), "Information is data that has been processed into a meaningful form for users, useful for decision-making or as a source of reference."
7. According to Susanto in the same journal (2019:63), "Information is the result of data processing that provides meaning and benefit."
8. According to M. Azmi, M. S. Shihab, D. Rustiana, et al. in the journal by Desy Apriani, Tarisya Ramadhan, Erna Astriyani, et al. (2022:25), "An Information System (IS) is generally a system that combines human activities and the use of technology to support management and operational tasks. It represents the interaction between people, data, information, technology, and algorithms."
9. According to Andri Kristanto in the journal by Euis Nurninawati, R. Achmad Rachmat S, and Dedy Prasetya Kristiadi (2022:25), "An information system can be defined as a system that collects, processes, stores, analyzes, and disseminates information for specific purposes. Like other systems, an information system consists of inputs (data, instructions) and outputs (reports, calculations)."
10. According to J. Hutahaean in the journal by Nurman Hidayat and Kusuma Hati (2021:9), "An information system in an organization meets the needs of daily transaction management, supports operational and managerial activities, as well as strategic actions, and provides necessary reports for certain parties."
11 According to Rachmadi (2020:354), "Data is a record of real-world facts representing objects such as people, goods, animals, concepts, events, etc., expressed in the form of letters, numbers, symbols, images, text, sounds, or other combinations."
12 According to Rizky Putra Fhonna and AR Marzuki (2021:354), "Data are facts that describe events and actual entities. Based on these definitions, data can be concluded as raw material processed to provide information."
13 According to Sari, M and Asmendri, A in the journal by Aris Martono, Arsi Yulianjani, and Amilia Sudariyanti (2023:84), "Observation is an empirical scientific activity based on field study and text through experience without manipulation. The purpose of observation is descriptive—qualitative research generates theories and hypotheses, while quantitative research tests them. Observers must have close access to the environment and research subjects."
14 According to A. Syamsudin in the journal by Hana Ariefa Adzhana, Evi Nursanti Rukmana, and Asep Saeful Rohman (2022:84), "Observation is the activity of recording phenomena or events using tools or instruments for scientific or other purposes."
15 According to Ariyadi Wijaya (2020:255), "An interview is a guide containing open-ended questions that refer to the research objectives. Another instrument used is the observation sheet, which is used to obtain data for the next cycle."
16 According to Ulfah (2022:256), "An interview is conducted using various predetermined standard guidelines. The questions are designed to match the required information, and each question is necessary to uncover empirical data.

2.2 Specialized Theory

1. According to Anisah and Melati Suci Mayasari in the journal by Sudaryono and Efana Rahwanto (2020:88), "A database is a collection of integrated data organized in such a way that the data can be manipulated, retrieved, and searched."
2. According to J.Enterprise in the journal by Rahmat Gunawan, Eva Wulan Ndari, and Meiniarti (2021:165): A website or web is defined as a collection of pages consisting of several web pages that contain information in digital form, whether in the form of text, images, videos, audio, and other animations, made available through an internet connection.
3. According to Gata and Windu in the journal by Henderi and Nur Azizah (2020): UML stands for "Unified Modeling Language," which is a part of a visual modeling method for designing object-oriented systems. UML is defined as a language that has become the standard for visualizing, designing, and documenting software systems. Over time, UML has become the standard language for writing software blueprints.
4. According to Heru Stiawan et al. (2022:54): PostgreSQL is an open-source relational database management system (RDBMS). This database management system can process data in related tables and can be used freely and modified. The main function of PostgreSQL is to store and manage data through SQL commands or queries.
5. According to Panjaitan, J and A. F. Pakpahan (2021): ReactJS is a front-end library initially developed by Facebook and is used as a supporting component in web framework development. ReactJS allows developers to create more interactive, stateful,

and reusable user interface components.

6. According to Irene Anindaputri Iswanto (2022): The Spring Framework is an open-source framework based on Java that provides a comprehensive infrastructure for developing Java applications easily and quickly. Spring can be used for declarative transaction management, remote access using RMI or other web services, mailing facilities, and various options for configuring data to a database.
7. According to R. Rama (2022): Java is a programming language that will be used in this research. In the mid-1990s, SUN Microsystems introduced a new programming language called Java. According to SUN's definition, Java is the name of a set of technologies used to build and run software in standalone or networked computing environments.
8. According to Kendal in the journal by Cleorangga Mandang David C J. Wuisan and Jeener G L. Mandagi (2020:49): "Rapid Application Development (RAD) is an object-oriented approach to system development that includes a development method and software tools."
9. According to Sukamto and Shalahuddin in the journal by Rian Febriani and Rina Noviana (2020:5): "Blackbox testing is testing software based on functional specifications without examining the design and source code."
10. According to Andi Prastomo in the journal by Haryanto, Yesica Adelia Tambunan, Cyntiya Maramis et al. (2020:10): Elicitation is a method for requirements analysis in software engineering. Elicitation is a set of activities aimed at discovering the needs of a new system through communication with customers and stakeholders involved in system development.

11 According to Yulis Nuryanti in the journal by Candra, Agung Prabowo, and Suratno (2023:75), "PIECES is a framework used to identify problems by analyzing performance, information, economics, application security, efficiency, and user service of a system."

2.3 Literature Review

According to Rowe. F in the journal by Diah Priharsari (2022:100): A literature review is a study that synthesizes previous knowledge within a particular domain, highlighting differences, interesting aspects, and gaps from various perspectives of prior knowledge, followed by suggesting directions for future research. Based on this definition, the author concludes that a literature review does not aim to contribute to theory, but rather to explain and classify what has already been produced by previous research. Nevertheless, as a research method, a literature review still has the potential to develop theory.

Based on the information obtained, several studies discuss service information systems, including:

1. This research was conducted by Indah Dwi Purwanti and Wahyu Sri Utami (2023) entitled "Computer Service Application at AURES Computer Magelang Based on Android". It explains that AURES Computer is a computer store that offers repair services for computer devices and sells computer accessories. The issue in this study is that its business process is still traditional, where customers have to come directly to the store for service, making it inefficient for many customers. This research aims to provide a service ordering application for AURES Computer that makes it easier for customers to get their computers serviced without having to visit the store. The method used is the System Development Life Cycle (SDLC), with data collection through observation and interviews. The result of this research is an Android application developed using Kotlin programming language, with Android Studio as the software and MySQL as the database server.
2. This research was conducted by T. Pradita and A. Mubarok (2021) entitled *"Service Information System at Lucky Photo"*. Service development has progressed through the internet, making it easier for customers and employees to handle tasks. The issue faced by Lucky Photo involves inefficient service operations including printing, sales, stock, purchases, and reporting. The aim of this study is to develop a service information system entitled *"Service Information System at Lucky Photo"*. The researchers built a web-based application using the waterfall method as a benchmark. The resulting system facilitates the service operations, makes customer transactions easier, streamlines report generation, and manages customer data effectively.
3. This research was conducted by Annisya Sekar Cakra Buana, Mukjizah Dwi Prihartina, Santi Pertiwi Hari Sandi, and Dwi Epty Hidayaty (2023) entitled *"Computer Service in Improving Customer Loyalty at Recovery.U"*. High-quality computer service plays a crucial role in improving customer loyalty. The purpose of the industry visit was to gain direct experience and insight into how computer service processes are carried out and observe how technicians perform their tasks. The authors used a descriptive-observational method. Primary data was collected through interviews and direct observations, while secondary data was gathered from articles or books related to the topic. The results showed that Recovery.U prioritizes both technical services and responsive advice in handling customer requests to increase loyalty. Service quality and satisfaction significantly affect customer loyalty. To improve services, the company needs to increase the number of employees based on workload, customer demand, and service scope so that they can handle more requests daily.
4. This research was conducted by Enny Diah Astuti and Nika Sintesa (2020) entitled *"Service Quality Toward Customer Satisfaction in Food Delivery Applications"*. The digital business is growing

rapidly, including in online-based food services. The internet enables interactive communication between sellers, consumers, and business partners. It allows companies to continuously collaborate to improve products, marketing, delivery, and service quality to achieve customer satisfaction. One rapidly growing business is food delivery services, such as GoFood, GrabFood, and ShopeeFood. These services are increasingly competitive and influenced by customer responses and service quality. The purpose of this study is to examine how service quality affects customer satisfaction in online-based food delivery apps. This research used quantitative analysis methods. Data was collected through questionnaires, and variable indicators were tested for validity and reliability using the Pearson Correlation approach.

5. This research was conducted by Mohamad Faizal Rizki and Aries Saifudin (2022) entitled *"Design of a Web-Based Laptop Service Monitoring Information System at Fentacom.ID Store in Depok City"*. Fentacom.id is a store engaged in laptop, notebook, and MacBook repair services since 2010. Its operations were still conventional, with customers checking repair progress by visiting the store or contacting the store via phone or SMS. Based on this issue, the researchers proposed building a service monitoring information system to provide repair status updates to customers. The research method used was the Web Development Life Cycle (WDLC), with PHP as the programming language and MySQL as the database management system. This web-based system provides information about the repair status of customer devices, which can be accessed through the Fentacom.id website to improve service quality and increase customer satisfaction.

3. METHODOLOGY AND RUNNING SYSTEM ANALYSIS

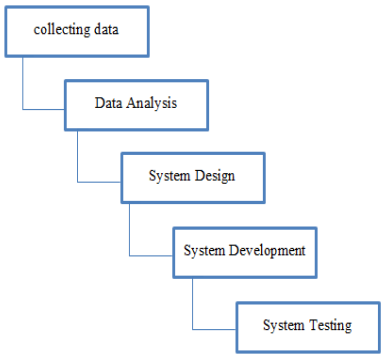


Figure 1. Waterfall Method

This research adopts a web-based information system development approach, incorporating several supporting methods ranging from data collection to system testing. The methodology employed in this study is described as follows:

1. **Data Collection Methods**

Data collection was conducted using three main approaches:

- Direct observation at PT. Top Airconditioner to examine the actual service process, including booking flows, service reporting, and data management activities.
- Interviews were conducted with internal stakeholders, particularly the owner of PT. Top Airconditioner, to gain in-depth insight into system requirements and existing operational challenges.
- Literature review was conducted by examining references from scientific journals, articles, and other relevant sources to support the system design process

2. .**System Analysis Method**

The system analysis was carried out using the PIECES method (Performance, Information, Economy, Control, Efficiency, and Service). This method serves to identify existing system problems and provide a structured framework for proposing a more effective and efficient system.

3. **System Design Method**

The system design uses the Unified Modeling Language (UML) approach, which includes the development of use case diagrams, activity diagrams, sequence diagrams, and class diagrams. The design process was conducted using the Visual Paradigm software. The system is implemented using Java with the Spring Boot framework for the backend, ReactJS for the frontend interface, and PostgreSQL for the database. The deployment is carried out through the Google Cloud Platform.

4. **System Development Method**

The development process follows the Rapid Application Development (RAD) approach. RAD was chosen due to its ability to accelerate the development cycle through iterative stages, which include:

- Requirement planning
- System design prototyping
- Development and user feedback gathering
- Final implementation

5. **System Testing Method**

The system is tested using the Blackbox Testing method, which focuses on evaluating the system's functionality based on input and output without examining the internal structure of the code. This testing ensures that the system meets its functional requirements, such as service input, data storage, and service report generation.

3.1 Current System Procedure Design

To analyze the existing system, this study uses the Unified Modeling Language (UML) to illustrate the current procedures and processes.

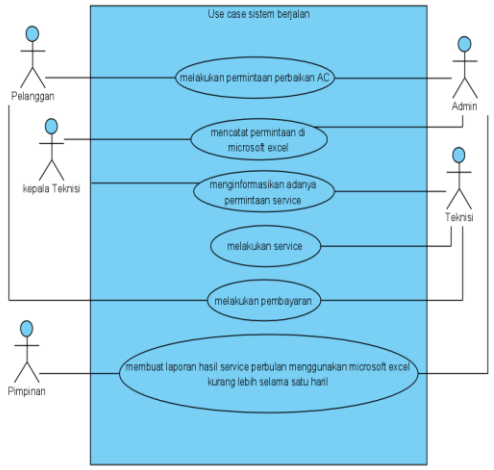


Figure 2. Use Case Diagram of Running System

Based on the presented Use Case diagram, several actors are involved in the AC service workflow. The initial interaction involves the Customer and the Admin, where the customer contacts Top Airconditioner via WhatsApp. The Admin then records the customer's complaint and logs the service booking. Following that, the Admin communicates the customer's complaint and booking schedule to the Head Technician. The Head Technician forwards this information to the Technician for further action. The Technician proceeds to perform the service directly at the customer's residence. Once the service is completed, the customer makes the payment to the Technician. Finally, the Admin prepares a service report, which is then submitted to the Management for review.

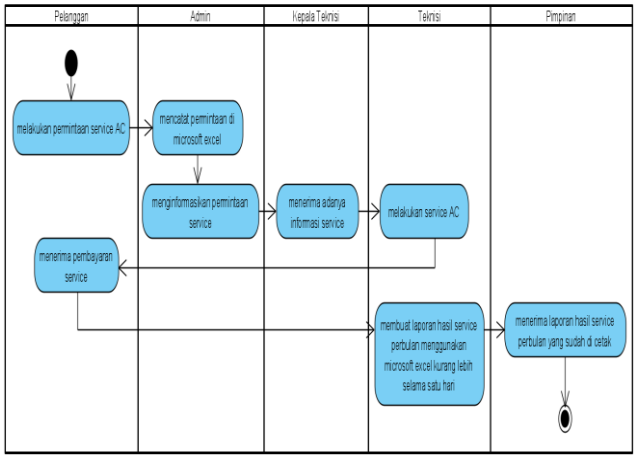


Figure 3. Activity Diagram of the Running System

The customer submits an AC service request to the admin. The admin records the complaint and service booking, then informs the head technician about the booking. The head technician forwards the booking information to the technician, who then performs the service by visiting the customer's home. After completing the service, the customer makes the payment to the technician. The technician then prepares a service report using Microsoft Excel, which takes approximately one day, and prints the report to be submitted to the management.

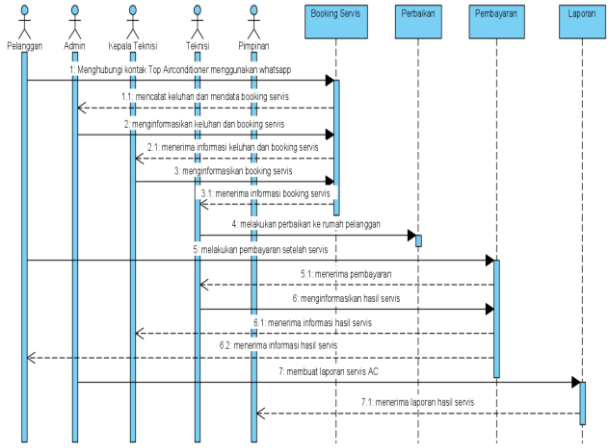


Figure 4. Sequence Diagram of the Running System

The customer submits an AC service request to the admin. The admin records the complaint and service booking, then informs the head technician about the booking. The head technician notifies the technician about the scheduled service, after which the technician visits the customer's home to perform the service. After the service is completed, the customer makes the payment to the technician. The technician then prepares a service report using Microsoft Excel, which takes approximately one day, prints the report, and submits it to the management.

3.2 PIECES Analysis Method

The current AC service operations at PT. Top Airconditioner have several weaknesses. Therefore, the researcher analyzed these shortcomings using the PIECES method (Performance, Information, Economy, Control, Efficiency, Service), which is expected to address various issues found in the existing system. The analysis can be seen in the table below :

Analysis	Current System	Proposed System
Performance	Service data recording and report generation still use Excel, which takes a considerable amount of time.	A system is used to record service data, allowing faster data processing.
Information	Service data is still recorded using Excel, which can lead to human error due to input mistakes.	A web-based system is used, making the data more accurate, up-to-date, and the information more clearly structured.
Economy	Requires the purchase of office supplies (ATK), leading to additional expenses.	The use of a system reduces the need for office supply purchases, lowering operational costs.
Control	Information and data security are poorly managed due to the lack of a structured storage system such as a database. Data is only stored in Excel files on local computers.	User access rights and activity logs are implemented, making it easier to monitor and secure the system, and helping detect any misuse. It also allows users to better control incoming and outgoing data.
Efficiency	The current system consumes a lot of time, making it inefficient and ineffective. As a result, decision-making is delayed due to the time required to obtain information.	The new system enables faster and more accurate data and information processing. It also facilitates easier data entry, searching, and retrieval, as it is web-based and thus more flexible.
Service	Difficulty in monitoring which services have been completed and which have not.	The system provides information on which services have been completed and which are still pending.

Table 1. PIECES Analysis Method

After conducting direct observation and interviews, the author obtained information regarding the current system in operation. Several issues were identified, including:

- the recording of AC service transactions still relies on basic Microsoft Office applications, resulting in non-automated data processing and time-consuming report generation; and

- service reports are still created using Microsoft Excel, which often leads to data entry errors and unclear documentation.

Based on the observations at PT. Top Airconditioner, it is evident that an AC service management system is needed to minimize errors in service data processing. Therefore, a computerized service management system is required to address the current challenges in handling AC service data.

To solve the identified problems at PT. Top Airconditioner, the author proposes the following solutions :

- to design a system that facilitates user operations, enabling greater efficiency and time savings;
- to develop a system that can record AC service activities, store the data, and generate printable reports; and
- to create a system capable of monitoring which AC services have been completed and which are still pending.

4. RESEARCH RESULT

After reviewing and evaluating the current system in operation, the author designed a new system aimed at addressing the weaknesses of the previous system, with the goal of reducing the recurring issues that often occur.

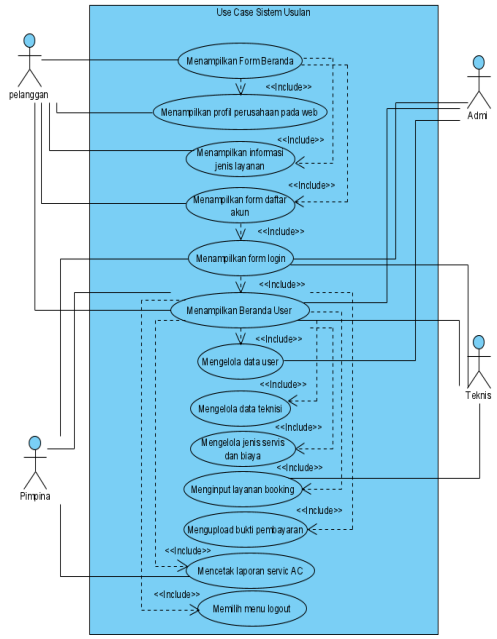


Figure 1. Proposed System Usecase Diagram

In the newly designed system, several actors interact with various use cases to carry out their respective roles. The **Customer** actor can access several features, such as the **Home** page to view the homepage content, the **Profile** page to view the profile of PT. Top Airconditioner, and the **Service Types** menu to explore available service categories. Customers can also perform **Registration** to create an account and use the **Login** function, which is also accessible by **Admins**, **Technicians**, and **Management**. Upon successful login with the correct username and password, users are directed to their respective **User Homepages**, where customized menu options are displayed.

The **Admin** actor has access to various administrative features, including managing **User Data**, **Technician Data**, **Service Types and Pricing**, **Service Bookings**, and **Payments**. The **Management** actor (Pimpinan) has the authority to view reports, such as **Service Booking Reports** and **Payment Reports**, for monitoring purposes. Finally, the **Logout** function is available to all users—**Management**, **Admin**, **Customer**, and **Technician**—allowing them to securely exit the system when finished.

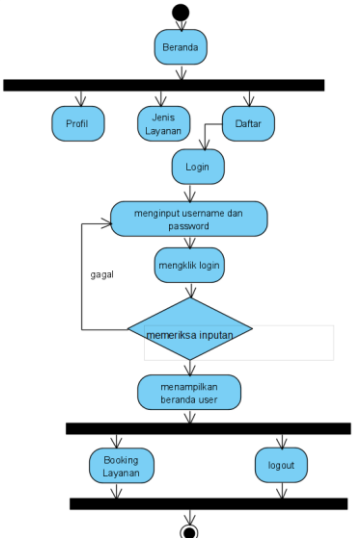


Figure 2. Activity Diagram of the Proposed System for Customers

The activity diagram consists of several key components. There is **one Initial Node**, which marks the starting point of the process, and **ten Action States** that describe the various system activities. Additionally, there is **one Decision Node** used for branching during the login verification process. The diagram also includes **two Fork Nodes** that represent parallel branching of system activities, and **one Join Node** to merge the parallel processes. Finally, the diagram concludes with **one Final State**, indicating the end of the activity flow.

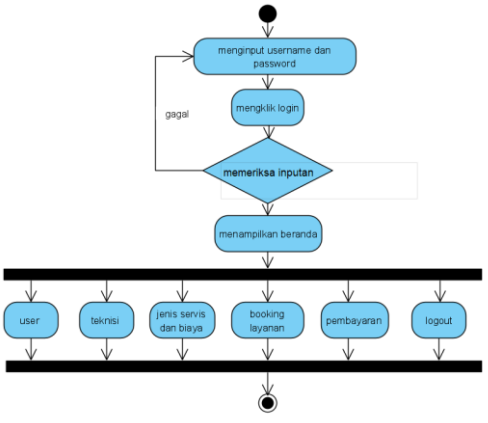


Figure 3. Activity Diagram of the Proposed System

for Admin

The activity diagram contains several essential components. It includes **one Initial Node**, which represents the starting point of the process, and **nine Action States** that illustrate the system's activities. There is also **one Decision Node** used to handle branching during the login verification process. In addition, the diagram features **one Fork Node** for splitting system activities into parallel paths, and **one Join Node** for merging those activities back together. Finally, the diagram concludes with **one Final State**, marking the end of the process flow.

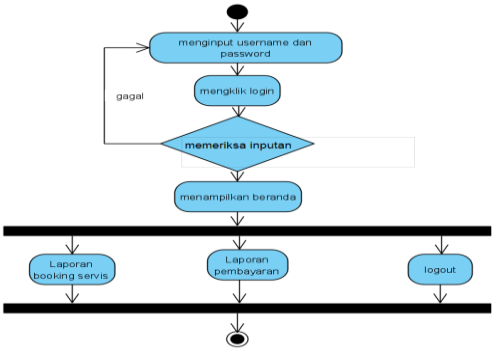


Figure 4. Activity Diagram of the Proposed System for Leadership

The activity diagram includes several key elements. It starts with **one Initial Node**, indicating the beginning of the process, and contains **six Action States** that describe the system's activities. There is **one Decision Node**, which handles branching during the login verification process. Additionally, the diagram features **one Fork Node** to represent parallel branching of system activities and **one Join Node** to merge those activities. The process concludes with **one Final State**, marking the end of the system flow.

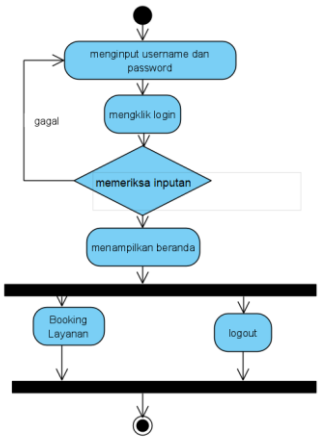


Figure 5. Activity Diagram of the Proposed System for Technicians

The activity diagram consists of several important components. It begins with one Initial Node, representing the starting point of the process, and includes five Action States that describe the system's activities. There is one Decision Node used for branching during the login verification stage. The diagram also contains one Fork Node to indicate parallel branching of activities and one Join Node to merge these activities. The process ends with one Final State, which signifies the conclusion of the system flow.

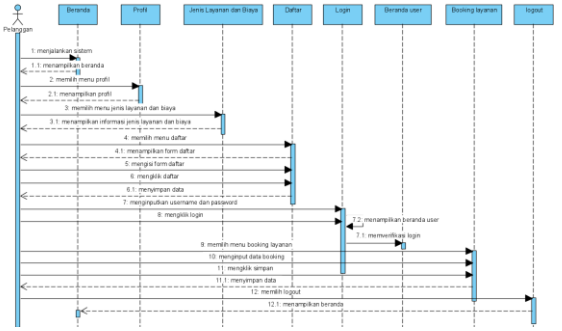


Figure 6. Sequence Diagram of the Proposed System for the customer

The sequence diagram includes several key elements. There is **one Actor**, namely the customer, who interacts with the system. The diagram also features **eight Lifelines**, which represent the activities of different objects within the system. Additionally, there are **twelve Messages** that illustrate the communication between objects, indicating the actions to be performed during the interaction.

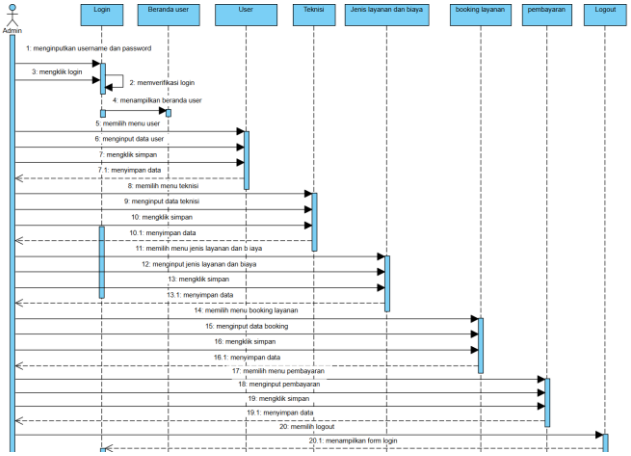


Figure 7. Proposed System Sequence Diagram for Admin

The sequence diagram consists of several important components. It includes **one Actor**, namely the customer, who interacts with the system. There are **eight Lifelines**, which represent the activities of various objects within the system. Additionally, the diagram contains **twenty Messages** that illustrate communication between objects, depicting the actions to be carried out throughout the interaction process.

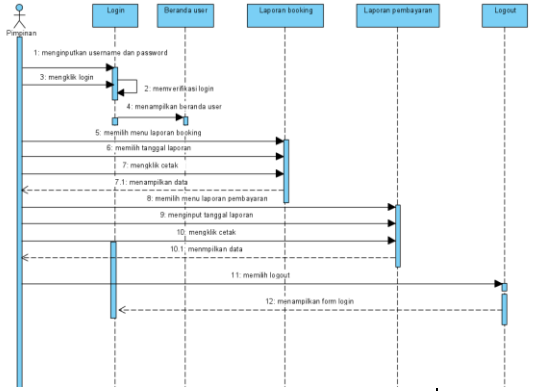


Figure 8. Sequence Diagram of the Proposed System for Leadership

The sequence diagram includes several key components. It features **one Actor**, namely the customer, who interacts with the system. There are **five Lifelines**, which illustrate the activities of different objects within the system. Additionally, the diagram contains **twelve Messages** that facilitate communication between objects, representing the actions to be performed during the interaction.

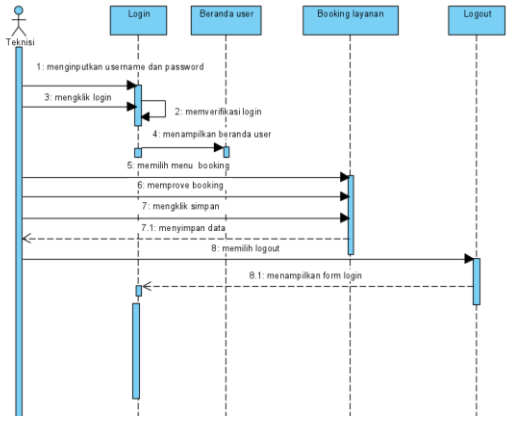


Figure 9. Sequence Diagram of the Proposed System for Technicians

The sequence diagram consists of several essential elements. It includes **one Actor**, namely the customer, who initiates interaction with the system. There are **four Lifelines**, which represent the activities of various objects involved in the process. Additionally, the diagram features **eight Messages** that serve as communication between objects, illustrating the actions to be executed during the interaction.

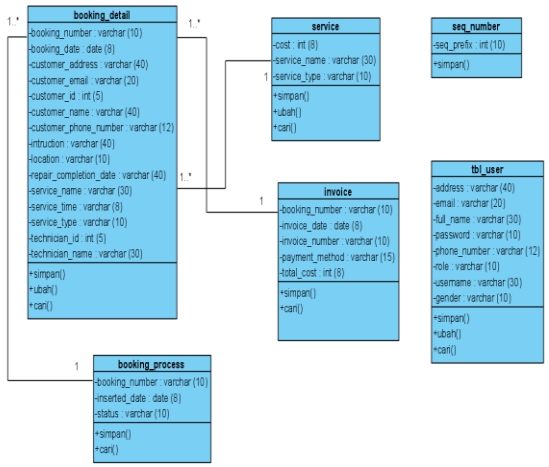


Figure 10. Class Diagram of the Proposed System

Based on the class diagram image above, it illustrates the proposed system, which contains 6 tables: tbl_user, booking_detail, booking_process, invoice, service, and seq_number.

No	Current System	Proposed System
1	Service data recording and report generation are still done using Excel, which takes a considerable amount of time.	A system is already in place to record service data, making data processing faster.
2	Service data is still recorded using Excel, which may lead to human errors due to incorrect input of service data.	A web-based system is already in use, making the data more accurate, up-to-date, and the information clearer and more structured.
3	Requires the purchase of office supplies (ATK), resulting in additional expenses.	With the system in place, it reduces the need for office supply purchases, thus lowering expenses.
4	Information and data security are poorly controlled due to the lack of structured storage like a database. Data is still stored as Excel files on local computers.	There are user access restrictions and log history features that help control security and detect any misuse of access. It also helps users monitor incoming and outgoing goods and information more efficiently.
5	The report generation process in the old system takes a whole day, making it inefficient and ineffective.	The new system allows faster and more accurate report and information generation. It also simplifies data entry, data search, and access to needed information due to its web-based nature, making it more flexible.
6	Difficulty in monitoring which services have been completed and which have not.	The system provides clear information on services that have been completed and those that are still pending.

Table 1. Differences Between the Existing System and the Proposed System

Nama Field	Tipe Data	Panjang	Keterangan
Address	Varchar	40	Address
Email	Varchar	20	Email
Full_name	Varchar	30	Full name
Password	Varchar	10	Password
Phone_number	Varchar	12	Phone number
Role	Varchar	10	Role
Gender	Varchar	10	Gender
username	Varchar	30	Username

Table 2 tbl_user

Nama Field	Tipe Data	Panjang	Keterangan
Booking_number	Varchar	10	Booking number
Inserted_date	Date	8	Inserted date
status	Varchar	10	status

Table 3. booking_process

Nama Field	Tipe Data	Panjang	Keterangan
booking_number	Varchar	10	Booking number
booking_date	Date	8	Booking date
customer_Address	Varchar	40	Customer Address
customer_email location	Varchar	20	Customer email location
customer_id	Int	5	Customer id
customer_name	Varchar	40	Customer name
customer_phone_number	Varchar	12	Customer phone number
instruction	Varchar	40	instruction
repair_completion_date	Varchar	40	Repair completion date
location	Varchar	10	
service_name	Varchar	30	Service name
service_time	Varchar	8	Service time
service_type	Varchar	10	Service type
technician_id	Int	5	Technician id
technician_name	Varchar	30	Technician name

Table 4. booking_detail

Nama Field	Tipe Data	Panjang	Keterangan
Cost	int	8	Cost
Service_name	Varchar	30	Service name
Service_type	Varchar	10	Service

Table 5. service

Nama Field	Tipe Data	Panjang	Keterangan
Seq_prefix	int	10	Seq prefix

Table 6. seq_number

Nama Field	Tipe Data	Panjang	Keterangan
booking_number	varchar	10	Booking number
invoice_date	Date	8	Invoice date
invoice_number	Varchar	10	Invoice number
payment_method	varchar	15	payment method
total_cost	Int	8	Total cost

Table 7. invoice

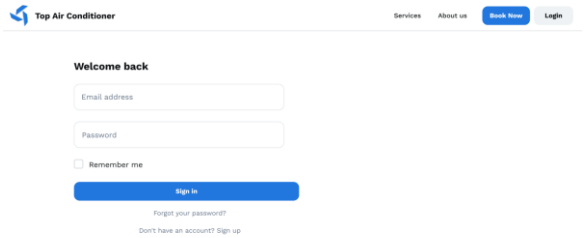


Figure 11. Login Form Display

serves for data security. Users must input their username and password first before using the system.

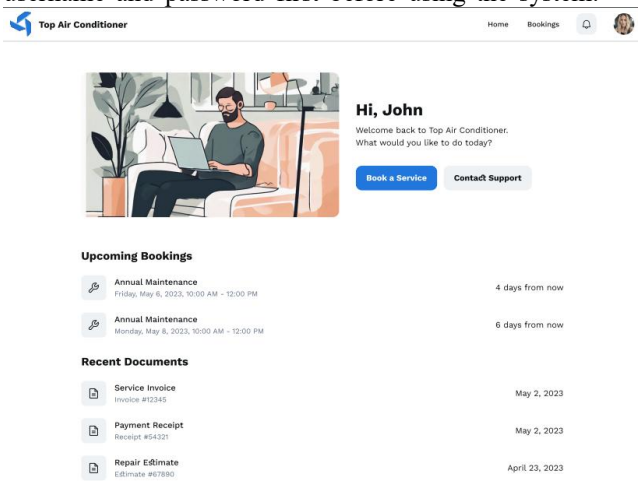


Figure 12. dashboard form display

is the dashboard display that appears when the user has finished logging in.

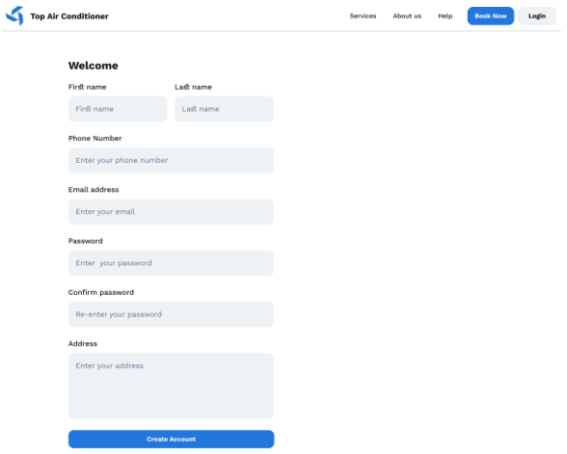


Figure 13. Service Booking Form View

is a display of the service booking form which functions to book service.

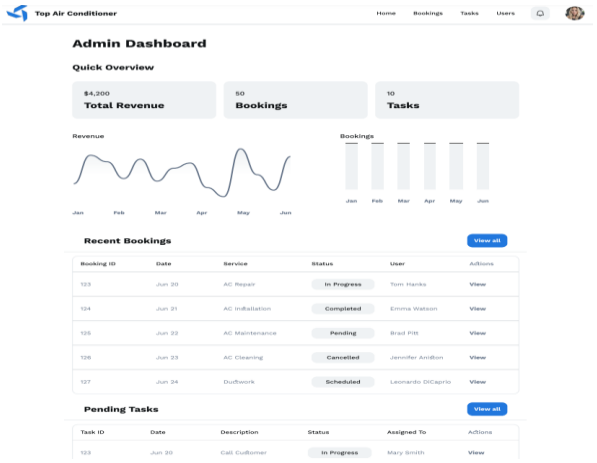


Figure 14. Admin Dashboard Form View

is the dashboard display that appears when the admin has finished logging in.

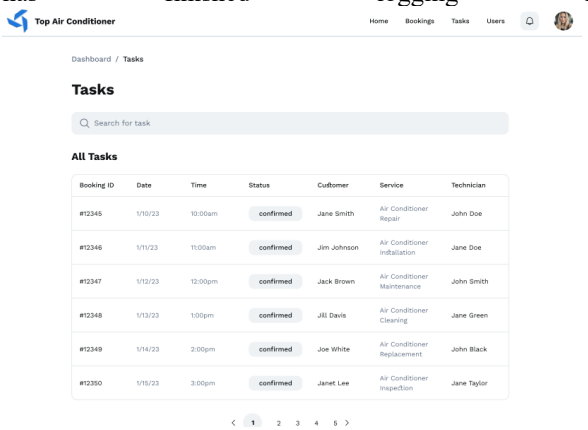


Figure 15. Payment Form Display

Payment form display that functions to input payment data

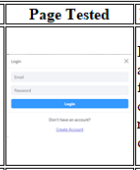
No.	Test Scenario	Page Tested	Expected Result	Test Result	Status
1.	If the username and password fields are left empty, an error will appear		If the username and password are filled in correctly, it will navigate to the dashboard page		Valid
2.	If the username and password are entered correctly		The dashboard menu will be displayed		
3.	Incomplete booking data input		The system will not be able to save the data		

Table 8. BlackBox testing

After conducting testing using the BlackBox Testing method by providing inputs to the program to be implemented, such as testing the login function and data entry during data addition, it was observed that the system responds accordingly. For example, if the input data is invalid, a message from the system will appear. This is very useful and greatly helps application users in entering correct data into the system, so that it can be processed to provide accurate, efficient, and reliable information.

5. CONCLUSION & RECOMMENDATION

Based on the previous analysis and discussion, the author can conclude that:

The current data management system for AC service operations still uses Microsoft Excel, which leads to problems such as data entry errors by the admin and a time-consuming process that takes approximately one day to generate service reports. The proposed AC service system addresses these issues by providing a report generation feature based on specific dates, eliminating the need to use Microsoft Excel for report creation.

In the proposed system, customers can use the platform to book AC service appointments, and the booking data is securely stored in the database. Additionally, the admin can accept AC service bookings through the system and monitor which bookings have been completed and which are still pending.

In this study, the researcher analyzed and developed a web-based AC service management system using a MySQL database. The system facilitates customers in booking AC services and submitting payment proof by uploading transaction receipts. Moreover, technicians can input service results directly into the system, ensuring that service data is stored securely.

Training is needed for employees on how to use the AC service management system to ensure that it operates effectively.Additional computer and server infrastructure is required to support the implementation of the AC service management system. Regular maintenance is necessary to ensure that the system remains well-managed and operates smoothly.

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