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Enterprise Architecture Design of Station Information System Using TOGAF ADM Model: Case Study Bus Station Sungai Kunjang

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Abstract: Sungai Kunjang is one of the primary land transportation facilities in Samarinda City, East Kalimantan, located on Untung Suropati Street in the Karang Asam Ulu subdistrict. Officially inaugurated on June 24, 1989, by Mayor Waris Husain, it serves multiple transportation modes, including public passenger vehicles (PPV), pioneer services, and intercity routes. Although the station currently provides essential information services—such as departure schedules, route options, fare details, and a basic complaint system—these services are not yet supported by a structured Information Technology (IT) and Information System (IS) framework. The lack of integration hampers service efficiency and the optimization of business processes. This research aims to design an Enterprise Architecture (EA) for the station by applying The Open Group Architecture Framework (TOGAF) Architecture Development Method (ADM). The proposed design focuses on aligning business objectives with IT/IS strategies to improve the delivery of transport information and complaint management services. The resulting blueprint is expected to serve as a strategic reference for developing an integrated information system that enhances decision-making, streamlines operations, and improves service quality at Sungai Kunjang Station. By using selected phases of the TOGAF ADM, the study provides a practical foundation for digital transformation within public transport infrastructure in the region.

Index Terms: Design, Enterprise Architecture, Information Systems, Station, TOGAF ADM.

1. Introduction

A station is a key component of a transportation system, primarily functioning as a temporary stop for public vehicles to pick up and drop off passengers and goods until they reach their destination [1]. The Sungai Kunjang Station is a land transportation station in Samarinda City, East Kalimantan. It is located on Jl. Untung Suropati, Karang Asam Ulu. Officially inaugurated by the Mayor of Samarinda, Waris Husain, on June 24, 1989, this station provides transportation services, including Public Passenger Vehicles (PPV), pioneer transportation, and intercity transportation.

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The station is managed by the Samarinda Transportation Agency to facilitate the region's transportation needs effectively. The limited use of technology at the Sungai Kunjang Station restricts station management in providing information to the public or prospective passengers. Generally, transportation service information includes schedules, routes, fares, and complaint services. The management of the Sungai Kunjang Station has not yet implemented Enterprise Architecture (EA) to align its strategies with its business strategies.

Currently, while the station management provides information services effectively, the lack of a systematically structured IT/IS design hinders the optimization of business process activities. Information regarding transportation services is still conveyed using bulletin boards within the station area. As a result, prospective passengers have limited access to comprehensive service information at the Sungai Kunjang Station. There is a data graph showing the number of passengers at the Sungai Kunjang Station, which recorded an increase in arriving and departing passengers from 2018 to 2019. However, in 2020, there was a decline in both arriving and departing passengers due to a reduction in the number of transportation services and passengers.

Based on the issues outlined above, an enterprise architecture design is needed for managing transportation services, including schedules, fares, routes, and complaint services at the Sungai Kunjang Station. Using the TOGAF ADM model, this design will produce a Togaf framework or blueprint that can later serve as a reference for implementing a system to improve information services at the Sungai Kunjang Station.

2. Literature Review

2.1. Enterprise Architecture

Enterprise Architecture (EA) is a strategic approach that ensures alignment between organizational objectives, business processes, and Information Systems (IS) as well as Information Technology (IT) infrastructure. EA enables organizations to optimize operational performance through integrated service delivery, standardized processes, and structured governance. In the context of public transportation facilities—such as stations—EA plays a significant role in ensuring the seamless flow of transportation information, including schedules, routes, fares, and complaint handling.
The application of EA at Sungai Kunjang Station is essential to identify current operational gaps (as-is architecture), define improvement needs, and establish a blueprint for future system development (to-be architecture). A well-designed EA will support decision-making, increase service accessibility for passengers, and enhance operational effectiveness for station management [2].

2.2. TOGAF Architecture Development Method (ADM)

The Open Group Architecture Framework TOGAF is a comprehensive architectural framework, and a set of supporting tools designed to guide enterprise architecture. A key component of TOGAF is the ADM, which provides a specific outline for improving EA processes. The Architecture Development Method is illustrated as a cycle comprising nine process steps [3].

In this research, TOGAF ADM is adopted because it provides a systematic framework for developing an enterprise architecture that connects business strategies with digital solutions. The selected TOGAF phases—Preliminary Phase, Requirements Management, Architecture Vision, Business Architecture, Information Systems Architecture, and Technology Architecture—are aligned with the study objectives, which focus on designing a blueprint without implementing full deployment stages such as Migration Planning. This selection ensures practicality while maintaining strong architectural governance suitable for Sungai Kunjang Station.

2.3. Value Chain

A value chain is a cycle in which an organization identifies primary and supporting activities that add value to its products or services and then evaluates them to reduce costs or enhance differentiation [4].

3. Research Methods

3.1. Research Step

This research uses a qualitative descriptive approach with a case study method conducted at Sungai Kunjang Station, Samarinda. The research focuses on designing enterprise architecture using selected phases of the TOGAF Architecture Development Method (ADM). The methodology explains the research flow, data collection techniques, modeling tools, and architectural outputs at each stage to ensure the consistency and validity of the results [5]. These phases include Preliminary Phase, Requirements Management, Architecture Vision, Business Architecture, Information Systems Architectures, and Technology Architecture which will be explained as follows:

1) Preliminary Phase

This phase is the initial stage of preparing the enterprise architecture and determining the scope of the architecture to be developed. Key tasks in this phase include defining principles as the foundation for architecture development (Principal Catalog) and identifying the 5W+1H [6].

2) Requirements Management

The goal of this phase is to determine the architectural requirements for designing the information system for the Sungai Kunjang Station [7].

3) Architecture Vision

This phase serves as the initiation stage of the architecture development cycle, which includes defining the scope and obtaining approval to begin architecture development [8].

4) Business Architecture

In this phase, the current business activities at the Sungai Kunjang Station are analyzed to develop a business architecture that supports the architectural vision. The desired architecture is then modeled [9].

5) Information System Architecture

This phase focuses on the development of data and application architecture, emphasizing how the information system architecture will be built, including data and application architectures that will be used by the Sungai Kunjang Station [10].

6) Technology Architecture

This phase is intended to define the technology architecture to support the required information system architecture. Steps to build the technology architecture include Network Architecture, Technology Platform, and Specifications for required software and hardware [11].

3.2. Data Collection

1) Observation

Observation is an appropriate and explicit strategy for gathering information and means collecting data to be used as the subject of study in research [12].

2) Literature

The literature study is used to assist researchers in finding and collecting relevant information by utilizing theories that will be applied in the research process. This information can be obtained from various sources such as scientific works, books, and other references [13].

3.3. System Analysis Plan

According to Rosa A.S and M. Salahuddin, Unified Modeling Language (UML) is a standard language widely used in the industry to define requirements, conduct analysis and design, and describe architecture in object-oriented programming [14]. The UML diagrams to be elaborated are:

1) Use Case Diagram

According to Murad, A use case diagram is a state diagram that displays a set of use cases and actors a special type of class.

2) Activity Diagram

According to Sukamto and M. Salahuddin, an activity diagram illustrates the workflow or activities of a system, business process, or menu within software.

4. Result and Discussion

4.1. Presentation of the TOGAF Model

1) Preliminary Phase

This phase defines the architectural principles and identifies the 5W+1H. Below is the Table of Architectural Principles and Identification of 5W+1H [15].

Table 1 shows, four architectural principles: business, application, data, and technological independence. These principles aim to ensure that the architecture aligns with business goals, is easy to use and develop, secure and accessible, as well as flexible to prevent data incompatibility, thereby supporting the efficiency, security, and effectiveness of business processes in the station [16].

Table 1. Principle Catalog

Architectural Principles	Objective
Business Principles Architecture created must comply with goals in activities business at the Station	Supports in business processes in the Station Supports in improve
Application Principles In planning Application architecture, system should be easily used by the user and easy in system development	Ease in use of the application can increase effectiveness business processes
Data Principles Data Architecture must safe and easy in access	Data (information) and system must be protected, and data should be easily accessible when required
Data Principles Technological Independence	Using, software, hardware, and platform to prevent data not compatible

Table 2 shows, the process of designing the station information system architecture using the 5W+1H method, where the design is based on TOGAF for transportation services such as schedules, fares, routes, and complaints [17]. The research was conducted by the researcher as a case study at the Samarinda Across Bus Station, with a target completion date in December 2024. The main goal is to facilitate management, improve services, and provide a reference for internal systems, while the design process is carried out using the TOGAF framework with the TOGAF ADM phases [18].

Table 2. Identification of 5W + 1H

Identification	Object and Description
What	Object: Architectural Scope Description: Enterprise Design Creator Architecture Station uses the TOGAF model, which produces service design transportation regarding schedules, fares, routes, and complaint services
Who	Object: Who makes the Plan Enterprise System Architecture Station Information? Description: Case study researcher
Where	Object: Where was this research conducted Description: This research was conducted at the Samarinda Across Bus Station
When	Object: When is the completion time for this design? Description: In December 2024
Why	Object: Why make plants Enterprises Architecture System Station Information? Description: To help with management Business strategy Station. So that makes it easier to give information and can improve service. especially service transportation of information schedules, fares, routes and services complaints, so that later you can used as an internal reference implementation of system creation
How	Object: How to carry out the process Enterprise Architecture Design Station Information System. Description: Leverage Frameworks TOGAF by applying several TOGAF ADM phase in EA station design

2) Requirements Management

a) Core Business (Main Business Activities)

The main business activities at the Sungai Kunjang Station involve providing transportation services related to schedules, routes, fares, and complaint handling, The implementation of IT/IS design can serve as a reference in system development [19].

b) Organizational Issues

From the results of observations and analysis of business processes and activities at the Sungai Kunjang Station, the following issues were identified:

1) Limited utilization of information technology in the process of delivering information.
2) Information delivery is still conducted by installing notice boards and using loudspeakers as information tools at the Sungai Kunjang Station.
3) Suboptimal services provided by station management.
4) Business Solutions

Table 3 shows, issues of insufficient delivery information and suboptimal management services at the station. The solutions include utilizing IT/IS support for information delivery and enhancing details about schedules, fares, routes, complaint services, and other relevant information at the station [20].

Table 3. Business Solutions

Problem	Improvement Suggestions
Delivery Means Information	Providing IT/IS support in delivery of information
Less than Maximum Management Services station	To increase service at the station the manager provides transportation services information regarding schedules, fares, routes, complaint services, and other information around the station

1) Architecture Vision

a) Definition of Vision and Mission

The vision created by the Kunjang River Station is to create reliable, orderly, nationally competitive transportation services, with public transportation as the main service. description of the mission of the Kunjang River Station, among others Realizing safe, smooth, secure, integrated transportation services, realizing informative transportation services based on information communication technology, realizing environmentally friendly transportation that supports accessibility for people with disabilities, Guaranteeing affordable transportation costs for the community [21].

b) Organizational Goals

The objectives of achieving the vision and mission of the Kunjang River Station include improving transportation services, creating transportation services that utilize information technology, providing affordable costs for the community [22].

4.2. Use Case Diagram

The Activity Diagrams in this study are used to validate the functional processes modeled in the Business Architecture. Fig. 1. shows diagrams represent how users interact with system components, ensuring that each business requirement is supported by a clear workflow. Rather than elaborating every action sequence, the diagrams serve as a structural reference showing functional alignment between business needs and the proposed information system. The two-way arrows represent mutual communication to ensure passenger needs are met [23].

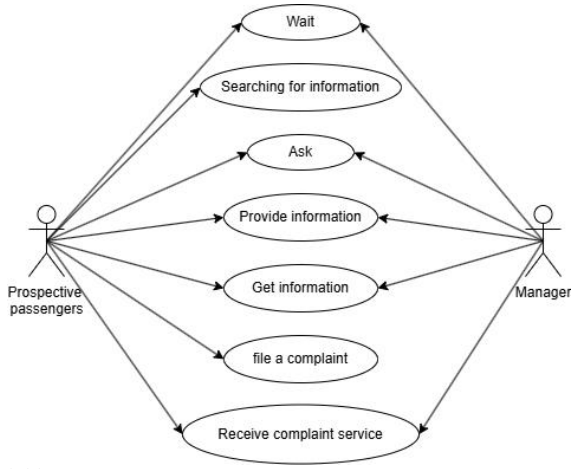


Fig. 1. Use Case of Ongoing Business Activities

Fig. 2. shows, Use Case diagram illustrating the interaction between User and Admin in a transportation system. User can Login, view the Web Station (timetable, rates, routes), and submit a Complaint. Admin can Login, manage Transportation Services, and handle Complaints. The Include relationship indicates the interconnection between use cases [24].

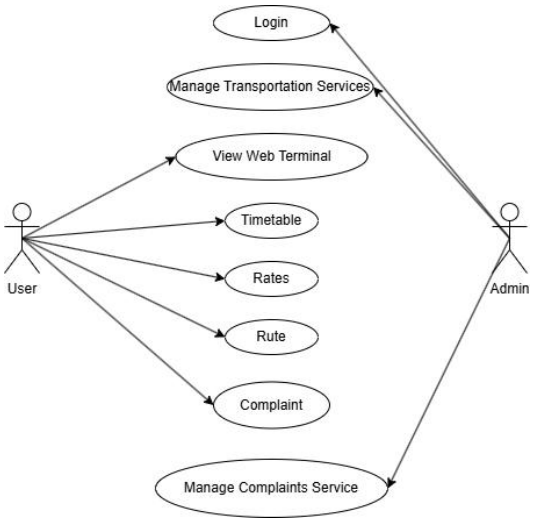


Fig. 2. Use Case of Proposed Business Activity Architecture

4.3. Activity Diagram

Fig. 3. shows, the process of schedule selection between the USER and the SYSTEM. The process begins with the user accessing the web station, after which the system displays the home page [25]. The user selects the schedule page, the system displays the page, the user chooses a specific schedule, and the system displays the selected schedule. The diagram uses a black circle to indicate the start of the process, arrows to show the flow of activities, and a red circle to indicate the end of the process.

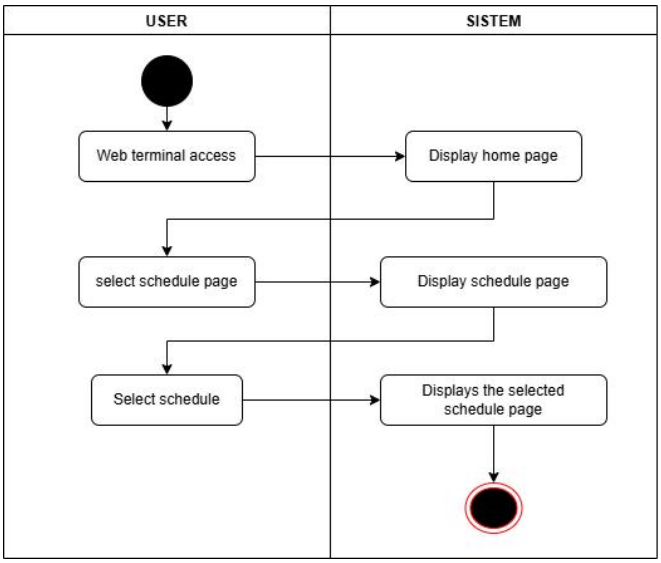


Fig. 3. Activity Diagram for Schedule

Fig. 4. shows, the process of fare selection between the USER and the SYSTEM. The process begins with the user accessing the web station, after which the system displays the home page. The user selects the fare page, the system displays the page, then the user selects a specific fare, and the system displays the selected fare [26]. The diagram uses a black circle to indicate the start, arrows to show the flow, and a red circle to indicate the end of the process.

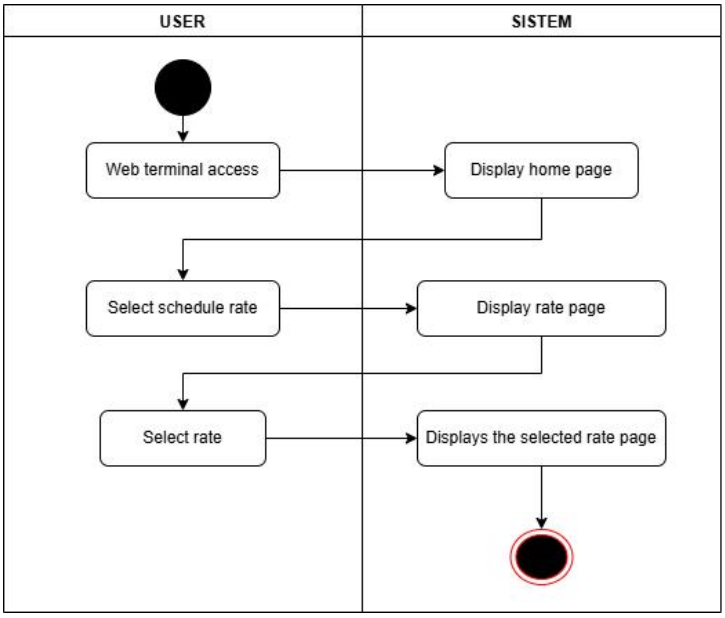


Fig. 4. Activity Diagram for Fare

Fig. 5. shows the process of route selection between the USER and the SYSTEM. The process begins with the user accessing the web station, after which the system displays the home page. The user selects the route page, the system displays the page, then the user selects a route, and the system displays the selected route [27]. The diagram uses a black circle to indicate the start, arrows to show the flow, and a red circle to indicate the end of the process.

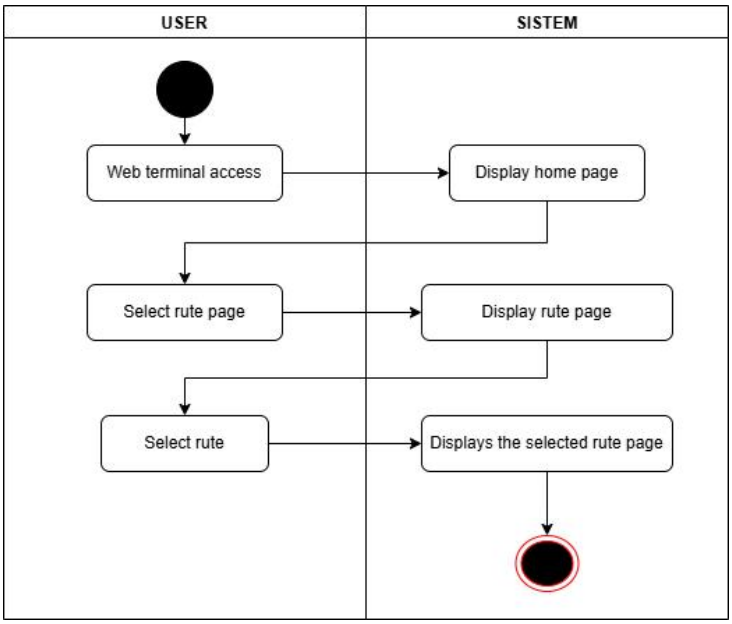


Fig. 5. Activity Diagram for Rute

Fig. 6. shows, the Activity Diagram for Complaints, which illustrates the process of submitting a complaint between the USER and the SYSTEM. The process begins with the user accessing the web station, after which the system displays the home page. The user selects the complaint page, and the system displays the page. The user then selects the option to submit a complaint, and the system displays the complaint form [28]. The user fills out the form and saves it, after which the system displays a notification confirming that the complaint has been successfully saved. The diagram uses a black circle to indicate the start, arrows to represent the flow of the process, and a red circle to mark the end of the process.

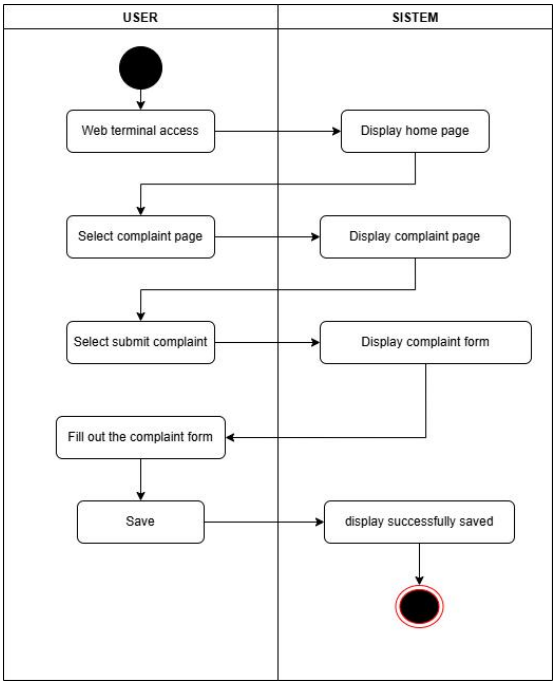


Fig. 6. Activity Diagram for Complaints

Fig. 7. shows, the Activity Diagram Login Admin, which illustrates the login process between the ADMIN and the SYSTEM. The process begins with the admin entering the username and password, followed by the system verifying the credentials [29]. If the verification fails, the system prompts the admin to retry the login process. If the verification is successful, the system displays the admin page. The diagram uses a black circle to indicate the start, arrows to represent the process flow, a diamond shape for decision points, and a red circle to indicate the end of the process.

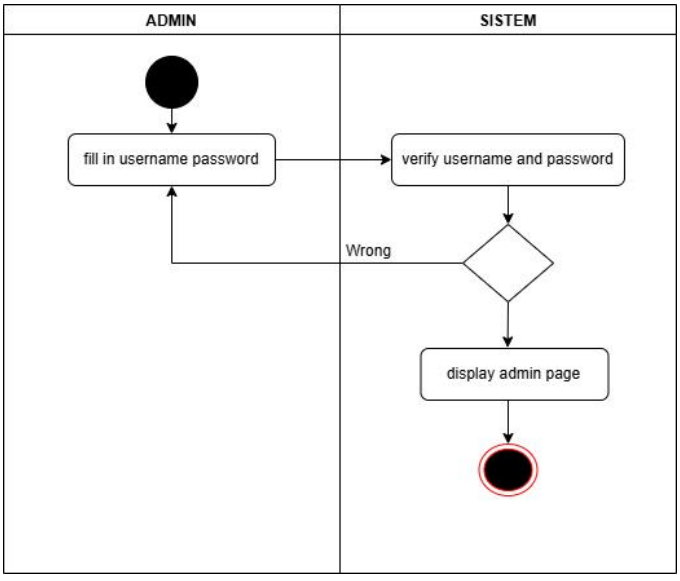


Fig. 7. Activity Diagram Login Admin

Fig. 8. shows the Activity Diagram for Managing Transportation Services, which illustrates the process of managing transportation services between the ADMIN and the SYSTEM. The process begins with the admin logging in using a username and password. The system verifies the login credentials; if the verification fails, the admin is prompted to log in again. If successful, the system displays the admin page. The admin selects the transportation management menu, such as schedule, rate, or route, then edits or deletes data and saves the changes [30]. The system displays a notification confirming that the data has been successfully saved. The diagram uses a black circle to indicate the start, a diamond shape for decisions, arrows for process flow, and a red circle to mark the end of the process.

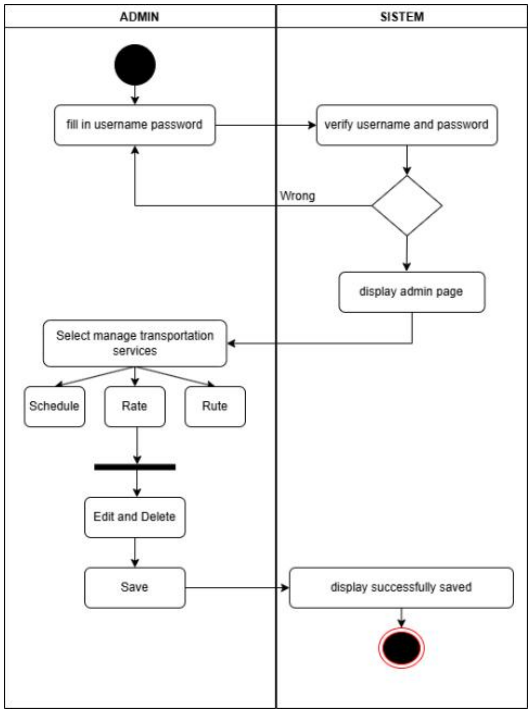


Fig. 8. Activity Diagram for Managing Transportation Services

Fig. 9. shows, the Activity Diagram for Managing Complaint Services, which illustrates the process of managing complaint services between the ADMIN and the SYSTEM. The process begins with the admin logging in using a username and password. The system verifies the login; if the verification fails, the admin is prompted to retry the login process. If successful, the system displays the admin page. The admin then selects the complaint management menu, views the complaint history list, replies to a complaint, and sends the response. The system displays a notification confirming that the response has been successfully sent. The diagram uses a black circle to indicate the start, a diamond shape for decisions, arrows for process flow, and a red circle to mark the end of the process.

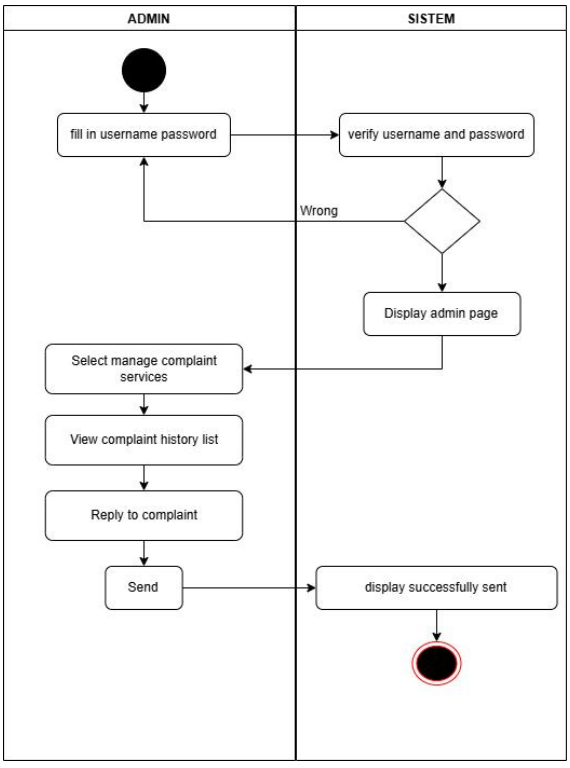


Fig. 9. Activity Diagram for Managing Complaint Services

4.4. Application Architecture

Table 4 shows, the Application CatLog Design, which explains the processes and system features within the application. The table includes a management system menu for admins that provides a login form, admin menu, and access to transportation services management, such as schedules, fares, routes, and complaints. For users, the application provides information about facilities, schedules, routes, fares, complaints, and contact options. The timetable feature is used to manage transportation departure schedules, while the route feature facilitates the management of destination routes at the station. The rates feature displays transportation price rates, and the complaint feature allows users to submit complaints related to service dissatisfaction and view complaint histories. The login feature includes a form for users and admins to input their username and password to access the system.

Table 4. Application Architecture Catalog for Transportation Service Information at Sungai Kunjang Station

Process	System Features
Management system menu information station done by Admin	Inside there is a Login form, Admin Menu, Transportation services regarding schedules, fares, routes and Complaints Service
User	It contains information facilities, schedules, routes, fares, complaints and contact us
Timetable	In form the schedules transport departure in manage in the station
Route	In form the price rates on transportation managed at the station
Rates	In form the destination route transportation managed at the station
Service Complaint	Users can submit complaints of inconvenience of service dissatisfaction given. And users can also the complaint history
Login	There is a form that contains username and password

4.5. Technology Architecture

Specification Hardware and Software, this phase involves making proposals regarding the hardware and software needed to support the proposed technology architecture.

Table 5 shows, the Software used in the system along with its specifications. The operating system is Windows 10 Home (64-bit), supporting stable application performance. Development is carried out using PHP and JavaScript as programming languages, with MySQL as the database management system for efficient data handling. The system is accessed through Google Chrome, ensuring reliable user interaction, while Microsoft Office 2019 is used for documentation and administrative tasks.

Table 5. Software Specifications Supporting the Proposed Information System Architecture

Software	Specification
Operating System	Windows 10 Home (64 bit)
Coding	PHP, JavaScript
DBMS	MYSQL
Web Browser	Google Chrome
Microsoft Office	2019

Table 6 shows, the Hardware used in the system along with its specifications. The CPU is AMD Core i5, supported by an Intel Core i5 3400T processor (1.70GHz up to 3.30GHz, 9MB Cache) for efficient performance. The system is equipped with 2GB RAM, using a mouse and keyboard as input devices, and an LCD monitor as the output device, ensuring smooth system operation and user interaction.

Table 6. Hardware Specifications Required for the Implementation of Station Information Services

Hardware	Specification
CPU	AMD Core i5
Processor	Intel Core i5 8400T (1.7Ghz up to 3.30GHz, 9MB Cache)
RAM	8GB
Input Device	Mouse, Keyboard
Output Device	Monitor LCD

4.6. Result of the Enterprise Architecture (EA) Design Blueprint

Fig. 10. shows, the results of the enterprise architecture design for Sungai Kunjang Station are in the form of a blueprint for transportation services, including schedules, fares, routes, and complaint services. Additionally, it produces an information system architecture and technology architecture to align the business strategies required by Sungai Kunjang Station.

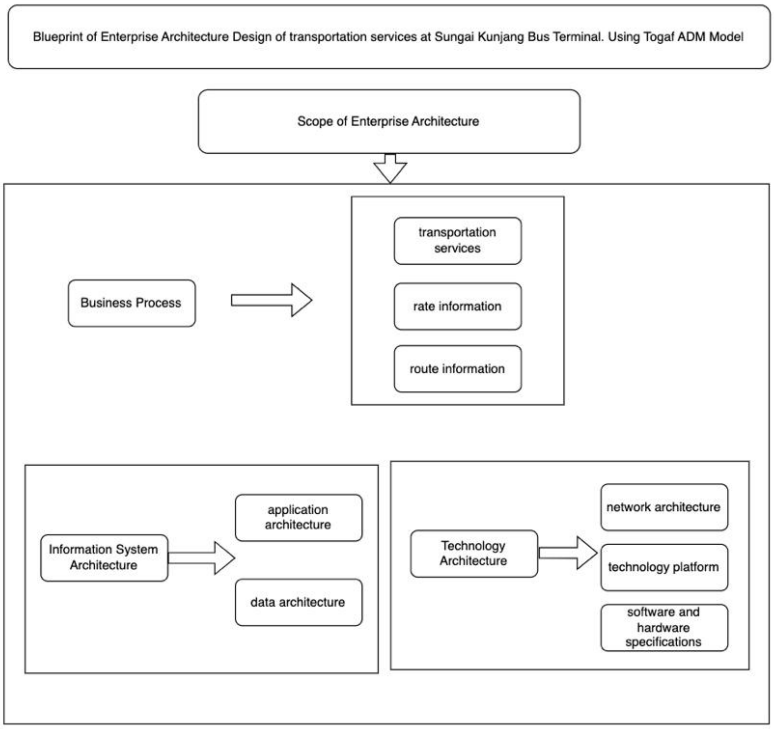


Fig. 10. Design Blueprint

5. Conclusion

Teachers and students went back to physical lectures once the mandates were lifted. They agreed that in future, they would use online lectures if their circumstances do not allow them to meet physically. Otherwise, their first alternative was physical lectures. Even in the cases where the lecturers enjoyed using multimedia, they did not employ all the features available for use in multimedia.

People are social beings. Literature is a social subject that deals with society and people, so it cannot be taught fully online. It, too, has practical sessions and its practical aspects are difficult to teach online. Students need to see physical demonstrations and responses from the audience when they make positive and negative statements. These are difficult to observe online.

And. even though creative writers compose in isolation, they require a physical audience to motivate, encourage or critique their work.

6. Recommendations

The Sungai Kunjang Station currently lacks a well-defined architecture design. Therefore, the researcher has developed an enterprise architecture design using the TOGAF ADM model to align business strategies and improve services at the Sungai Kunjang Station. The limited use of technology at the station has hindered the station management's ability to provide information to the public or prospective passengers, particularly regarding transportation services and complaint handling. The outcome of the Sungai Kunjang Station Enterprise Architecture design is a Blueprint for transportation services, including information on schedules, fares, routes, and complaint services. In addition, it produces Information System Architecture and Technology Architecture to align business strategies. By applying the phases of the TOGAF ADM architecture model, this design can serve as a reference for the implementation of an integrated Information System and Information Technology that meets the needs of Sungai Kunjang Station, enabling the station management to improve the delivery of information services to the public.

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