

# Analysis and Design of Regional Asset Leasing Management Information System in North Tapanuli Regency

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 Submitted: 2024-11-21; Accepted: 2024-11-30; Published: 2024-12-08

**Abstract**— Regional assets are something that has an essential role in the scope of local government because they have a complex value and are quite significant when compared to other components in the local government narrative. This requires local governments to be able to manage and utilize regional assets properly and correctly to increase Original Local Government Revenue in the region. Effective and efficient management of regional assets is one example of the management of the regional economy as shown in the Original Local Government Revenue. Improving the quality of regional asset management that is carried out professionally and modernly is a step taken to prioritize the principles of Good Governance. This research will discuss how to design a model for managing land assets of the North Tapanuli Regency local government that prioritizes the principles of Good Governance by utilizing information technology in the form of designing an information system that is expected to bring changes to the institutions that use it. The information system is expected to make the management of land assets spread across 15 sub-districts neater and more well-organized. In addition, the management of information related to asset leases can facilitate the reporting process and decision making. The purpose of this research is to design an information system as a reference for the Regional Finance and Asset Agency to develop an information system for managing regional assets and leasing regional assets by utilizing web-based and mobile technology. It is expected that through the information system designed in this research, the retribution payers can submit a Lease Application, upload the files of the Application Letter, and download the agreement letter through the application. Another technology that can be utilized in the information system to be built is the use of docker

containers to run a lighter database and save time when storing all data related to the object of retribution, retribution payers, applications, lease agreement contracts, bills, and payments. This research also applies data storage technology that divides data into several separate units and then stored in one repository called object storage technology. This technology is used to store large data, create backup copies and archives, and store large amounts of images, graphics, video, or audio files.

**Keywords**—Asset, Application, Information System, SDLC, Regional Government, Design.

## I. INTRODUCTION

Regional assets are something that has an essential role in the scope of regional government because they have a complex and quite significant value when compared to other components in the regional government balance sheet. This requires the regional government to be able to manage and utilize the regional assets it owns properly and correctly so that it can increase the Original Local Government Revenue in the region. Effective and efficient management of regional assets is one example of regional economic management shown in Original Local Government Revenue (Sanjaya and Jumanah, 2018). The corridor of regional property management puts a reference that regional property must be used as much as possible to support the smooth running of service tasks and functions, and to put the benefits of revenue donations for the region (Syahputra et al., 2019). That way, the regional government must be able to manage the assets it owns properly (Zaini, 2021). Regional asset management can be utilized through a rental system,

utilization cooperation, borrowing, and so on. Regional asset management should be regulated and handled properly in accordance with applicable government regulations. Improving the quality of regional asset management carried out professionally and modernly is a step taken to prioritize the principles of Good Governance (Sondakh et al., 2017).

Research conducted by Sutris Endi Subentra stated that regional asset utilization activities in Jambi City have not been optimal because many assets have unclear ownership and are not yet certified (Qurani, 2024). Meanwhile, other research conducted by Yufra et al. stated that BPPKAD Kupang City has not utilized land assets optimally because there are still many land assets that do not have certificates and the location of the land is not strategic (Tana et al., 2020). Likewise, in North Tapanuli Regency, asset management has not been carried out optimally because there are still many assets that are not clear who is leasing them, the certificates are not clear, and data related to the assets are still incomplete and stored properly in storage media. As a result, it is difficult for the North Tapanuli local government to keep track of assets that are or are not under lease. Another problem that makes asset leasing management less than optimal is related to poor administrative order, for example, there are unscrupulous lessees who lease North Tapanuli District Government assets to other parties without informing the authorized officer. As a result, the tracking of asset leases is not maximized, and lease documents are lost because people do not know where they are stored. One of the asset managements is inventory, which should be carried out properly and correctly, then there is a system that can control integrated asset management in a region (Sukmawati et al., 2021).

This study will discuss how to design an asset management model for the North Tapanuli Regency local government that prioritizes the principles of Good Governance by utilizing information technology in the form of designing an information system that is expected to bring change to the institutions that use it. Through the information system, it is hoped that the management of land assets spread across 15 sub-districts can be neater and more organized. In addition, the management of information related to asset lease can facilitate the reporting process and decision making. Local governments can also increase the effectiveness of their operations and can run their administrative operations efficiently with the help of information and communication technology (Toni Anwar et al., 2020). With the advancement of Information and Communication Technology, now is the time to provide electronic access to government facilities to citizens in various places (S. S. & U. K. Mateen, 2017). The information system model designed in this research is expected to provide a clear picture to the local government of the North Tapanuli district of how the administration of the management of the regional asset leasing is carried out. Starting from the management of retribution objects, retribution payers, asset leasing, asset

leasing agreement contracts, payments and reports related to the leasing of these regional assets, and the storage of complete documents as well as asset leasing agreement contracts and images of leased retribution objects into digital form into storage media in the form of object storage which is separate from the file system.

The problem of the procedure for leasing local government land assets in North Tapanuli Regency has levels starting from, Submit a Rental Application Letter to the Regional Finance and Asset Agency, Send the Application Letter files to the Regional Finance and Asset Agency office, Wait for Approval from authorized stakeholders, and Wait for the Agreement Letter signed by the Regional Secretary and then continue by picking up the agreement letter. All these things are still done manually, which takes a lot of time. This study is also based on previous research which explains that the manual system (the administrative process is still recorded in an excel file and the retribution payer still must come to the office to submit the application) causes the lease process of existing facilities to be irregular (Nasution, 2017). Other studies also explain the use of information systems for borrowing space and goods at Muria Kudus University where this system was created to improve the manual system. Complete and efficient borrowing stored in a database server (Khasbi, 2016).

Based on the problems described above, the purpose of this research is to design an information system as a reference for the Regional Finance and Asset Agency to develop an information system for managing regional assets and leasing regional assets by using web-based and mobile technology. It is expected that through the information system designed in this research, the retribution payer can 1) Submit a lease application through the application without the need to come to the office. 2) The documents of the application letter can also be uploaded through the application and stored in the database. 3) The letter of agreement can be viewed and downloaded through the application. Another technology that can be used in the information system to be built is the use of Docker containers to run applications anywhere as a lightweight container in which a database will be installed to store all the data related to retribution objects, retribution payers, applications, leases, invoices and payments, thus making the performance of the database used for data storage lighter and saving time. In addition to the technologies mentioned above, this research also applies a data storage technology that divides data into several separate units and then stores them in a repository called object storage technology. This technology is used to store large amounts of data, to create backups and archives, and to store large amounts of images, graphics, video or audio files.

## II. LITERATURE REVIEW

### A. Information System

An information system is an organized combination involving communication networks, users (people), software, and data resources that collect, transform, and

disseminate information in an organization. One of the functions of this information system is to increase the accessibility of data that has been previously presented in a timely and accurate manner for users (Anggraeni, 2017). The activities in the organization are managed by a computerized information system to produce the information needed by stakeholders who are inside or outside the organization. To optimize the efficiency of managing public resources, a web-based information system is needed (Melchor, 2016).

#### B. Application

According to Aziz, an application is a ready-made program designed to carry out a function for users or other applications and can be used by the intended target (Azis, 2018). Applications are translators of instructions that are executed by users and processed by hardware (Karnadi, 2021).

#### C. Assets

Assets are defined as a resource or wealth owned by an entity/company/organization. Therefore, assets must be maintained, protected and managed professionally so that they have a longer life and do not cause a decrease in selling value (Rachmawati, 2018). Government Regulation Number 6 of 2006 which has been amended by Government Regulation Number 27 of 2014 concerning Management of State / Regional Property and Minister of Home Affairs Regulation Number 17 of 2007 concerning Technical Guidelines for the Management of Regional Property which has been amended by Minister of Home Affairs Regulation Number 19 of 2016 concerning Guidelines for the Management of Regional Property are all goods purchased at the expense of the Regional Revenue and Expenditure Budget or other legal acquisition (Wicaksana, 2021). Regional asset management is all regional property that is purchased or obtained at the expense of the Regional Budget and Expenditure Revenue or other legal acquisition and then managed by an organization that has members to carry out control to achieve the organizational goals of the institution that have been previously determined.

#### D. Container

Container is a lightweight operating system that can directly work within the host operating system. Containers can run directly all the processes of instruction to the CPU core. Containers also can save the use of resources without the overhead of virtualization and can also guarantee the performance of isolated applications (Fihri et al., 2019). A container is a technology that packages applications, organized system libraries, and the associated dependencies to build the desired service in the form of a container or a container. Where applications that have been built and organized can be run as a container and can also be used as a container (Potdar, 2020).

#### E. Docker

Docker is a technology that lets developers or sysadmins build, package, and run apps anywhere as

lightweight containers. This is different from virtualization, where applications are run on top of a hypervisor and a guest operating system. Whereas in Docker, applications can run directly without the two things done by the hypervisor, which makes Docker more efficient in using server resources (Sutanto, 2021). The architectural design of Docker makes it easy to distribute and develop applications faster as Docker has the nature of light containers which are equipped with various components and features so that it can provide convenience for developers to develop and monitor the performance of the created applications (Fihriq al., 2019). Docker has a client-server architecture where clients can send requests to the Docker Daemon to build, distribute, and run Docker containers (Khalida, 2019). Docker minimizes the provision of unnecessary resources in application deployment. Deployment in Docker has high scalability that can be scaled horizontally. The server can be replicated into multiple nodes so that if one server crashes, there is still another server to serve requests. Another capability of Docker, which uses the container concept, is that one of them can check the container and its version, namely, to distinguish two or more containers so that the application can be easily fixed if necessary (Bellishree, 2020).

#### E. Object Storage

In object storage, each piece of data is stored as an object. Data, along with its associated metadata and unique identifier, is divided into chunks and stored on shared storage. These chunks and metadata are identified with a unique identifier at the time of retrieval. Metadata is critical to the success of object storage (Jyoti, 2021). Using a RESTful API, Object Storage is accessed directly from applications. An object is stored in a flat namespace. All other objects are stored in the same namespace. An object name is used to write to and read from Object Storage (Gavrin, 2021).

### III. RESEARCH METHODOLOGY

The Regional Asset Lease Management Information System in the Regional Government of North Tapanuli Regency is an information system used by the Regional Government of North Tapanuli Regency to manage data on retribution objects and retribution payers, data on lease applications and agreements, and other administrative data that can make it easier for the Regional Government of North Tapanuli Regency to manage all of it. So that this information system can be accessed and used anytime and anywhere, this information system must be deployed to an environment that can be accessed via the internet and placed in an environment that is easy to manage. The initial stage that needs to be done is to design the architecture, data and interface design of this regional asset management information system.

The design of this regional asset lease management information system model uses the System Development Life Cycle (SDLC) method which can be described as follows:

#### A. Data Collection

At this stage, data collection techniques are carried out by direct observation related to the current system related to the management of regional asset leases in the regional government of North Tapanuli district, interviews with related parties that are interrelated with this system such as retribution payers, field officers and officers in the office, management information system managers, and also all stakeholders involved in this system.

#### B. Problem Identification

At this stage, there are several actions taken to identify problems, namely:

1. Study the workflow of the information system starting from the application submitted by the levy payer until the application is approved and the lease agreement document is signed between the local government of North Tapanuli Regency and the levy payer.
2. Study the provisions and rules that apply related to the management of regional asset leases in North Tapanuli district.
3. Study the flow of data starting from the submission and approval of lease applications, ratification of lease agreements, lease payments, and data for preparing financial reports.
4. Analyze the regional asset management system within the local government of North Tapanuli Regency by making a system design based on the data that has been collected previously.

#### C. Literature Study

At this stage, what is done is to learn about the technology that can be used in building information systems for managing regional asset leases managed by the local government of North Tapanuli Regency and to learn facts related to this technology through sources related to this research either from reference books, textbooks, or previous studies that can be used to support this research.

#### D. Design of Regional Asset Lease Management Information System

The System Development Life Cycle (SDLC) method is used in the design of this information system. However, because this study is only up to the design of an information system, not all stages of this method are used.

1. Design of the system architecture  
The purpose of this planning stage is to determine and define what kind of architecture will be used in this household waste management information system. In this stage, some software and servers that will be used to create this architecture are also collected.
2. Functionality and Data Analysis  
In this stage, a use case diagram is used to analyze and describe the system functionality that will be used in this information system. Then the relationship between the data used in this system is designed and described in the form of a relationship

between tables that will be used in the database of this information system.

#### 3. Design of the interface

The result of this design is a docker-based virtualization architecture user interface design, which is planned to be the design of the proposed household waste management information system architecture using VPS (Virtual Private Server) as the server and in the server the docker application will be installed to create a container that contains the application of the information system, database, web server, and also other software that supports the information system.

The steps of the Regional Asset Lease Management Information System design above can be seen in the flowchart in Figure 1 below.

Figure. 1. Stages of the Design of the Regional Asset Lease Management Information System

## IV. RESULT AND DISCUSSION

In this discussion section, it will be described in relation to the stages carried out in this study, including:

#### A. System Analysis

This sub chapter will discuss the system analysis of the regional asset lease management system that will be made by describing the information system that is built into its respective component parts with the intention of identifying and evaluating what technologies are used in the system.

Researchers conducted interviews directly with retribution payers, field officers, and officers in the office to obtain information related to the stages carried out in leasing these regional assets. Starting from submitting a lease application, approving a lease application, ratifying a lease agreement, billing, and lease payments. At this stage, researchers can also obtain information related to user needs and expectations expected by retribution payers and regional asset managers, namely the Regional Government of North Tapanuli Regency.

### B. Design

The next stage carried out in this research is design, which is the next step in application development. In this stage, 4 (four) things are going to be designed, including the system architecture, how the user interacts with the system, the database, and the system's user interface. These four designs are very important as a foundation in application development before going to the next stage which is coding and testing.

System Architecture describes how the entire application to be developed gets structured and organized. It includes the selection of technologies, design patterns, and components that will be used to build the application. Application architecture aims to create a strong and efficient framework for managing various aspects of the application, including business logic, presentation, and user interaction. In this study, the structure and organization of the regional asset leasing management information system can be seen where there are technologies and components such as Web Server, Container for databases, File System, Object Storage S3, and so on. In this architecture, it can be seen how the relationship between interconnected components and user interaction with the system. For more details can be seen in Figure 2 below.

Figure. 2. Design Architecture System

To describe the relationship between users and the system being built can be described using a use case diagram. Use case is a technique that can be utilized for software development to determine the functionality needs of a system. In this study, there are several actors involved including retribution payers, Head of Agency, Head of Division, Head of Sub-Division, and Admin. These actors have their respective roles and responsibilities in this system.

1. **Retribution Payers:** The retribution payers act as an end user who uses the leasing service of local government-owned assets. Their roles include submitting leasing applications, viewing approved

applications, viewing authorized agreements, viewing bills, and making payments.

2. **Kepala Sub-Bidang:** The *Kepala Sub-Bidang* is an actor who manages new applications submitted by retribution payers, then approves the application if all conditions are met.
3. **Kepala Bidang:** The *Kepala Bidang* is an actor who approves the application that has been approved by the *Kepala Sub-Bidang* to be forwarded again approved by the *Kepala Badan*.
4. **Kepala Badan:** *Kepala Badan* is the actor who approves the application that has been approved by the *Kepala Bidang*. The application that has been approved by the *Kepala Badan* can be used as a reference in making a lease agreement between the retribution payers and the local government of North Tapanuli Regency.
5. **Admin:** Admin is an actor who must manage and monitor all features contained in the application/system. This includes managing rental requests, rental agreements, bills, and payments. Admin is also responsible for managing the application backend.

The Regional Asset Leasing Management Information System is a platform that can be used to facilitate interaction between retribution payers, regional asset managers and administrators in the management of leasing regional assets owned by the local government of North Tapanuli District. In this information system, the roles of each actor are clearly defined to ensure an optimal user experience. Retribution payers as service users, are responsible for submitting new applications related to the regional assets to be leased, viewing lease agreements, viewing invoices, and making asset lease payments. The *Kepala Sub-Bidang* has a key role in operating this information system which includes approving new applications from retribution payers, managing retribution objects, managing retribution payers, managing object retribution rates, managing lease agreements, and managing lease payments.

Admin has the highest role in this information system. The admin has access to all functions of the information system. The admin's responsibilities also include management and oversight, keeping the system running smoothly, and providing the necessary support to the Retribution Payers, *Kepala Sub-Bidang*, *Kepala Bidang*, *Kepala Badan*, and Admin. Figure 3 shows that the roles assigned to the retribution payers, *Kepala Sub-Bidang*, *Kepala Bidang*, *Kepala Badan*, and Admin are fundamental to the successful operation of the leasing management of local assets owned by the government of North Tapanuli Regency.

Figure. 3. Use case Diagram of Regional Asset Leasing Management Information System

The relationship between users has been designed, the next important thing that needs to be designed is the database. Database design is the process of defining the storage structure as well as how to retrieve data in the database. Database design can provide information according to various specific user needs. In addition, each application has its own requirements. Therefore, users can more easily get an understanding of the information structure. In this research, there are several related tables in the database. These tables will store data entered by

users and then will be processed into important information related to the management of leasing regional assets owned by the North Tapanuli District Government. The tables formed are retributionPayers, employee, retributionObject, retributionObjectRate, retributionObjectPhoto, leaseApplication, leaseApplicationDocument, leaseAggreement, leaseAggreementWitness, leaseBill, leasePayment, and leasePaymentDetail. The details are shown in Figure 4.

Figure. 4. Database Design of Regional Asset Leasing Management Information System

The design of the user interface (UI) is a key aspect of the preparation of the system to be built, as well as the design of the system functionality and the database design. Picture 3 can provide an overview that can be used as a guide in developing the design of the appearance and functionality that will be built on this Regional Asset Leasing Management Information System. This user interface design is an important element that can provide users with experience in interacting with the system. Figure 5, Figure 6, and Figure 7 illustrate the interface design that will be used by the lessor. In Figure 5, we can see the login page, which is the starting point of interaction between the user and the system. In this login page, the retribution payers are asked to enter a username and password to proceed to the next page. The correct username and password entered through the login page is useful to ensure that only authorized users can access the system.



Figure 5. Login Page Interface Design

Figure 6 is an interface design of the Main Menu page after the retribution payer has successfully logged in. This page displays the main features that can be selected by the retribution payer according to their needs in the system. For more details can be seen in Picture 6 below.



Figure 6. Main Menu Page Interface Design

Figure 7 is a picture of the interface design of the Lease Application Submission page for regional assets owned by the North Tapanuli district government. On this page, a list of lease application submissions that have been submitted by the retribution payers can be seen. Then to make a new lease application submission, the retribution payers can click the “*Tambah Permohonan*” button. For more details, it can be seen in Figure 7 below.



Figure 7. Rental Application Page Interface Design

In addition to the interface designs used by the retribution payers above, there are also interfaces used by the *Kepala Sub-Bidang* and Admin of this information system. As shown in Figure 8, Figure 9, Figure 10, Figure 11, and Figure 12. In Figure 8 we can see the login page, which is the starting point of interaction between the *Kepala Sub-Bidang* and Admin with the system. On the display of this login page, the *Kepala Sub-Bidang* and Admin are prompted to enter a username and password to continue activities to the next page. The correct username and password entered through the login page are useful to ensure that only authorized users can access the system.

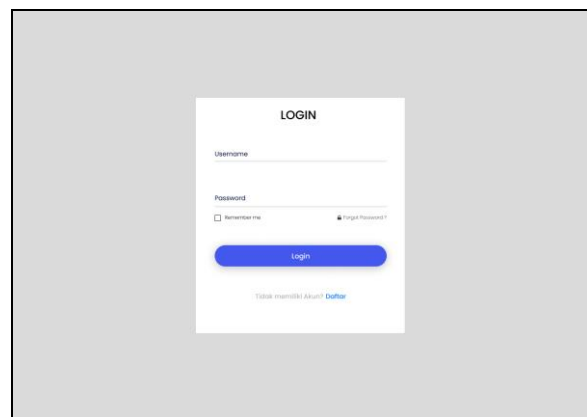


Figure 8. Web Login Page Interface Design

Figure 9 is a picture of the interface design of the Dashboard page after the *Kepala Sub-Bidang* or Admin

has successfully logged in. This page displays the main features that can be selected by the *Kepala Sub-Bidang* and Admin according to their needs in the system. For more details can be seen in Figure 9 below.



Figure. 9. Dashboard Page Interface Design

Figure 10 is a picture of the interface design of the Submission of Requests for Leasing of regional assets owned by the regional government of North Tapanuli Regency. On this page, you can see a list of rental application submissions that have been submitted by the retribution payer. For more details, see Figure 10 below.

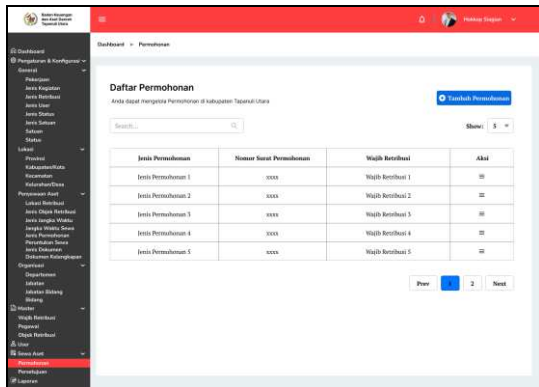


Figure. 10. Lease Application List Page Interface Design

Figure 11 is a picture of the interface design of the Approval of Lease Application page for regional assets owned by the North Tapanuli district government. On this page, you can see a list of rental application submissions that have been approved by stakeholders. For more details, it can be seen in Figure 11 below.

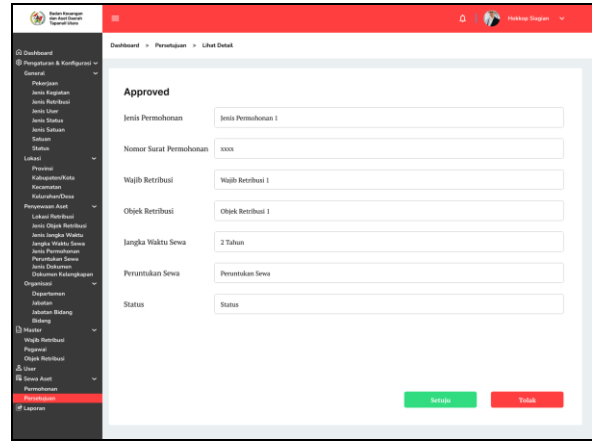


Figure. 11. Lease Application Approval Page Interface Design

## V. CONCLUSION

The system architecture design, use case design, database design and user interface design of the Regional Asset Leasing Management Information System owned by the local government of North Tapanuli Regency have been designed. Based on the results obtained, the design produced is the final design which will later be implemented to produce web-based and mobile applications for the management of regional asset leasing owned by the North Tapanuli District Government. Through this study, we hope to implement this design immediately so that the system to be built can run in the environment of North Tapanuli District Government and provide complete information related to the management of regional asset leasing and provide convenience to retribution payers to apply for regional asset leasing without having to come to the office. By implementing this architecture design, the North Tapanuli Regency Local Government is expected to be able to manage all assets owned by the local government with transparency, efficiency and easy accessibility to the management of assets owned by the North Tapanuli Regency Local Government. In addition, the Regional Asset Leasing Management Information System is expected not only to facilitate the management of regional asset leasing, but also to create an ecosystem that can support each other between the retribution payer and the North Tapanuli District Government, so that satisfaction is created between the two parties. In the future, the local government of North Tapanuli District needs to integrate the payment of regional asset leasing online using payment gateway technology. So that the retribution payers can easily make asset lease payments through various payment methods that are currently being developed.



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