Development of IT Asset Management Information System Using Laravel Framework at PT Mora Multi Berkah

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Abstract
Information technology (IT) assets are very important for business operations, but at PT Mora Multi Berkah they are still recorded manually, resulting in scattered data, unmonitored maintenance history, and slow reporting. This research aims to develop a web-based IT Asset Management Information System that encompasses the entire asset lifecycle, from procurement and assignment to maintenance, auditing, and disposal. This study adopts a research and development approach with the Waterfall model. Data were collected through observation, interviews, and documentation, and the system was modelled using UML and Entity Relationship Diagrams. This system is built with the Laravel framework, implementing the Model-View-Controller architecture and MySQL database, and providing role-based access for IT Admin, Staff, and Management. Black Box testing using equivalence partitioning shows that the test scenarios yield the expected results, while the System Usability Scale evaluation results in an average score of [score], which is categorised as [acceptable]. These findings indicate that the developed system effectively centralises IT asset data, enhances traceability, and accelerates report preparation to better support management decision-making.

Keywords: *Information System, IT Asset Management, Laravel, Waterfall, System Usability Scale*

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Introduction

The way organisations process, store, and use data in their operations has changed due to the rapid growth of information technology. Computers have evolved into more than just administrative tools; they are now means for processing and tracking data quickly, which allows for the reduction of human errors and the improvement of organisational work quality [1]. Simple computing to inventory management are some examples of areas where information technology has been used [2]The number of information technology devices owned by companies, such as computers, laptops, network devices, and software licenses, continues to increase as a result of this growing dependence. As a result, an effective management system is required [3].

Because its presence directly supports the smooth operation of the company's business processes, information technology (IT) assets are considered strategic resources. Increases in productivity, cost efficiency, and the speed of strategic decision-making have all improved thanks to good asset management. Conversely, disorganised management can lead to incorrect record-keeping, asset loss, and issues in maintenance and audit processes [4].

From a management perspective, IT assets must be managed throughout their lifecycle, not just when they are purchased. [5] states that IT asset lifecycle management consists of procurement, deployment, maintenance, auditing, and asset disposal. Traditional methods performed manually tend to cause errors and waste resources, whereas effective lifecycle management ensures operational efficiency, regulatory compliance, and cost optimisation. [6] state that fragmented data systems, limited visibility, and reactive decision-making often hinder conventional approaches to asset lifecycle management. Therefore, organisations need comprehensive asset visibility from procurement to disposal.

Many companies in Indonesia still use notebooks or simple worksheets, also known as spreadsheets, to manage their assets. This method is difficult to access in real-time, prone to human error, and less effective in tracking [4], [7] found a similar situation at PT MPM Finance Bandung: office inventory data, including computers and laptops, was processed using Microsoft Excel without a database, which took a long time. According to [8], manual asset recording is time-consuming and the presented data is incomplete. By using spreadsheets to manage IT assets, even companies engaged in IT solutions and services still face the risk of data duplication, recording errors, delays in information updates, and difficulties in monitoring asset status in real-time [9].

PT Mora Multi Berkah is based in the city of Medan and handles export and import. The company uses various IT assets to carry out its operations. This includes computers, laptops, printers, network devices, software licenses, and others. According to initial observations and interviews with the general department, the company's IT asset management is currently still done manually using Microsoft Excel. Several problems arise as a result of these conditions, namely: (1) asset data is not centralised, making it difficult to find the location of assets and their users, (2) repair and maintenance history is not documented, and (3) asset reporting takes a long time.

To address this issue, a web-based IT asset management information system is needed. This system allows multi-user access through the internet and intranet networks, enabling the recording, tracking, maintenance, and reporting of assets to be done quickly and clearly [4]. Laravel uses the Model-View-Controller (MVC) architectural pattern, which separates the view from the data processing, making the program code more structured and ensuring that changes to one component do not disrupt the others [10] This method has proven effective in the business world: [11] created a Laravel-based asset management application at PT Dirgantara Indonesia that accelerated the borrowing process, reduced recording errors, and improved the ease of accessing real-time asset information.

In several previous studies, the Laravel-based asset management information system has been implemented in local government agencies, educational institutions, and private companies [1], [10]. The authors found that asset recording, borrowing, and reporting were the

main focus of the research. Overall IT asset management based on its lifecycle, from procurement, placement, maintenance, and disposal, is still not well integrated into a single system, even though these elements are an important part of IT asset management [5]. Additionally, the business processes of each organization differ, so the system created must be tailored to the unique needs of PT Mora Multi Berkah.

Based on this explanation, the author intends to conduct research titled "Development of IT Asset Management Information System Using Laravel Framework at PT Mora Multi Berkah." As a basis for management decision-making, the developed system is expected to provide centralised IT asset recording, maintenance history documentation, asset status and location monitoring, and fast and accurate asset reporting.

Literature Review

1. Information System

[12] describe an information system as a set of interconnected components used to collect, process, store, and distribute information to assist in decision-making and company control processes. Hardware, software, databases, networks, procedures, and people as users are the components. In this research, the information system is responsible for transforming unused IT asset data into information accessible to management.

The type of information system used to meet the needs of middle management is a management information system (MIS). Transaction data enables the MIS to present routine reports on organisational performance, allowing managers to monitor and oversee operations [12]. In asset management, MIS provides reports on the quantity, condition, location, and history of assets. These reports are used to make decisions about procurement, repair, or disposal of assets.

2. Assets and Information Technology Assets

According to the International Organization for Standardisation (ISO), an asset is a good, object, or entity that has potential and actual value for the organization (ISO 55000). As part of the organization's assets related to information technology, IT assets include software and its licenses, as well as other supporting assets, and hardware (computers, laptops, servers, printers, network devices) [13]. IT assets have technical features that need to be considered, such as RAM, processor, storage capacity, VGA, screen, and operating system. This distinguishes it from regular office assets [3]. In addition, IT assets require stricter monitoring due to their short technological lifespan.

3. IT Asset Management and Asset Lifecycle

Managing IT assets effectively throughout their lifecycle is known as IT asset management or ITAM. The ISO/IEC 19770-1 standard governs the IT asset management system required by organisations [13]. Kulkarni (2024) states that the IT asset lifecycle consists of five steps: (1) Procurement: planning and purchasing assets. (2) Deployment: assigning asset codes and delivering assets to users or specific locations. (3) Maintenance: routine care and repair of damage. (4) Audit: examination of data conformity with the physical condition of the asset. (5) Retirement: withdrawal of damaged or obsolete assets from operation.

While manual methods tend to make mistakes, effective lifecycle management ensures operational efficiency, compliance, and cost optimisation [5]. [6] emphasise that comprehensive visibility from acquisition to disposal is crucial for asset lifecycle management. This can only be achieved with well-structured data. These two perspectives are used as the basis for building the system modules that will be discussed in this research.

4. Web-based applications

Web-based applications are software with a client-server architecture that runs on a server and can be accessed by users through a browser. Its main advantage is the ability to be accessed by multiple users through intranet and internet networks without the need to install the application on each computer. Therefore, asset recording, monitoring, maintenance, and

reporting can be carried out effectively and clearly [4]. This characteristic aligns with the needs of PT Mora Multi Berkah, which requires multiple departments to access asset data.

5. Framework Laravel

Laravel is a framework for PHP-based web applications that is open-source and implements the Model-View-Controller (MVC) architectural pattern [14]. The built-in features of Laravel that accelerate development include routing to map URLs to controllers; Eloquent ORM to access the database as objects; Blade as a templating engine; migrations and seeders to manage the database structure in a versioned manner; and features for authentication, authorisation, and input validation. Laravel also offers Artisan as a command-line interface.

Laravel helps manage applications [15]and creates an asset system that can reduce recording errors [11]

6. Modelo-Vista-Controlador (MVC)

The MVC architectural pattern was first used in the Smalltalk-80 environment and divides the application into three parts, each responsible for managing data and business rules, such as asset data, categories, and maintenance history. The view displays data to the user in the form of an interface. The controller receives user input, processes it through the model, and then selects the view to be displayed [16].

The code becomes more structured thanks to this separation. Changes to data or processes are made in the model and controller, but the view is only modified [17].

7. Unified Modeling Language (UML)

UML is the standard language for visualising, specifying, constructing, and documenting software system artefacts. This research uses four UML diagrams: (a) Use case diagram to illustrate the interaction of actors (admin, IT staff, management) with system functions. (b) Activity diagram to illustrate the flow of business processes, such as asset registration and mutation. (c) Sequence diagram to depict the sequence of messages between objects in a process. (d) Class diagram to illustrate the class structure and its relationships, aligned with the model in Laravel.

8. Black Box Testing

Black box testing is a testing technique that treats the program as a "black box." The tester does not pay attention to the internal structure of the code, but rather tests the output conformity with the specifications based on the given input. The commonly used technique is equivalence partitioning, which involves dividing input data into valid and invalid classes [18]This technique can be complemented with boundary value analysis, which tests values at the input boundaries [19].

9. Synthesis and Research Position

Three main conclusions were drawn from the literature review. First, it has been proven that Laravel with MVC architecture and MySQL database is suitable for building asset information systems for government agencies, schools, and businesses. Second, the majority of previous systems focused on recording, borrowing, and reporting general assets. The lifecycle is an important part of IT asset management [5], [6], but research focusing on IT assets has not yet covered the entire lifecycle [3], [9]. Third, the aspect of ease of use is rarely measured quantitatively in previous research, as system evaluation is usually limited to functional testing.

Based on these findings, this research positions itself as shown in Table 1.

Table 1. Research Positioning Relative to Previous Research

Aspect	Previous Research
Objek aset	Assets of an office, school, or government agency in general
Scope of the process	Recording, lending, reporting

Technical data	Generally not recorded
Evaluasi	Functional (Black Box or Alpha Testing)
Objek studi	Other institutions and companies

Therefore, the objective of this research is to create a Laravel-based IT asset management information system that implements the entire IT asset lifecycle and examines it from the perspective of functionality and user acceptance.

Research Methodology

1. Research Stages

Research Stages The research is conducted in seven sequential stages as shown in the following image. Stages 2 to 6 represent the application of the Waterfall model in Figure 1.

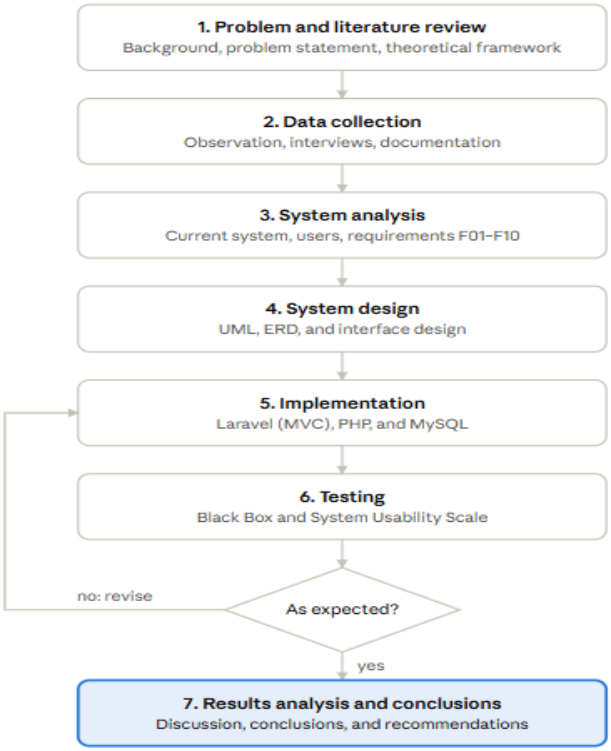


Figure 1. Research Stages

If the test results do not meet expectations, for example, if there is a failed Black Box scenario or an SUS score below 70, the system is fixed at the implementation stage and then retested. This cycle repeats until all criteria are met.

2. Black Box Testing

Each module in Table 2 is tested using the equivalence partitioning technique, which involves dividing inputs into valid and invalid classes [18]. An example of the test case design is presented in Table 3.3. A complete list is compiled for all modules F01–F10.

Table 2. Example of Black Box Test Case Design

ID	Modul	Scenario
BB-01	F01	Login with the correct email and password
BB-02	F01	Login with the wrong password
BB-03	F03	Adding assets with complete data
BB-04	F03	Adding assets with complete data
BB-05	F04	Transferring assets to another user

BB-06	F09	The staff opened the deletion approval menu.

3. Use Case Diagram

The use case diagram above shows how users interact with the IT Asset Management Information System at PT Mora Multi Berkah. The rectangle in the middle marks the system boundary, and the 14 ovals inside it are use cases, each standing for one function the system provides. Outside the boundary are three actors, the IT Admin, Staff, and Management, who represent the user roles defined in the system's role-based access control. Each solid line links an actor to a use case it can perform.

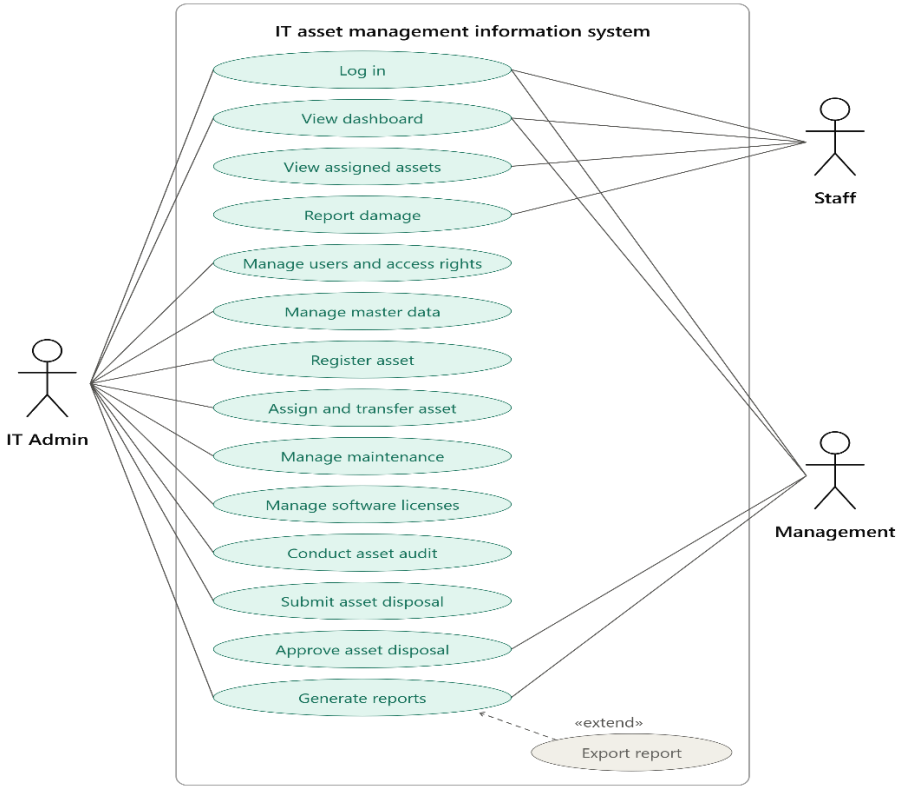


Figure 2. Use Case Diagram of the IT Asset Management Information System

Results

1. System Application Menu

The following is the display on the main menu of the IT Asset Management Information System Development Using the Laravel Framework at PT Mora Multi Berkah.



Figure 2. Main Menu

2. Login Menu

The figure above shows the login page of the IT Asset Management Information System at PT Mora Multi Berkah. This page is the system's main entry point, and every user must pass through it before reaching any feature. Its purpose is to verify each user's identity, so that only registered personnel can view and manage the company's IT asset data.

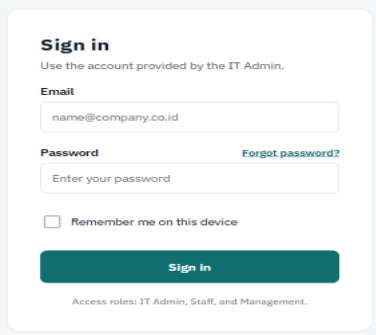


Figure 3. Menu Login

The figure above shows the login page of the IT Asset Management Information System at PT Mora Multi Berkah. This page is the system's main entry point, and every user must pass through it before reaching any feature. Its purpose is to verify each user's identity, so that only registered personnel can view and manage the company's IT asset data.

The page is titled "Sign in" and includes a short note: "Use the account provided by the IT Admin." The note tells users that they cannot register on their own. All accounts are created and managed centrally by the IT Administrator through the User and Access Rights module. This keeps the system secure and access controlled.

The "Sign in" button submits the entered credentials for validation. If the email and password match a registered account, the system sends the user to the Dashboard (the main menu), which shows the menus and features permitted for their role. If the credentials are invalid, the system shows an error message and the user stays on the login page. This behavior is tested in scenarios BB-01 and BB-02 of the Black Box testing.

The note at the bottom of the form, "Access roles: IT Admin, Staff, and Management," shows that the system uses role-based access control. After logging in, each user sees a different set of features: the IT Admin manages the entire asset lifecycle, Staff can view their assigned assets and report damage, and Management can monitor reports and approve asset disposals.

3. Main Menu After Login

The figure above shows the Dashboard, the main menu that users see right after signing in to the IT Asset Management Information System at PT Mora Multi Berkah. The page has three parts. A navigation sidebar on the left groups the modules into four sections: Main, Assets, Reports, and Settings. A header at the top holds the page title, a quick search field for asset codes, names, or users, a notification button, and the user's profile. The content area greets the logged-in user and offers two shortcut buttons, Download Report and Register Asset. Below them, four summary cards show key indicators at a glance: the total number of IT assets, the number of assets in use, the number under repair, and the number of software licenses expiring within 30 days.

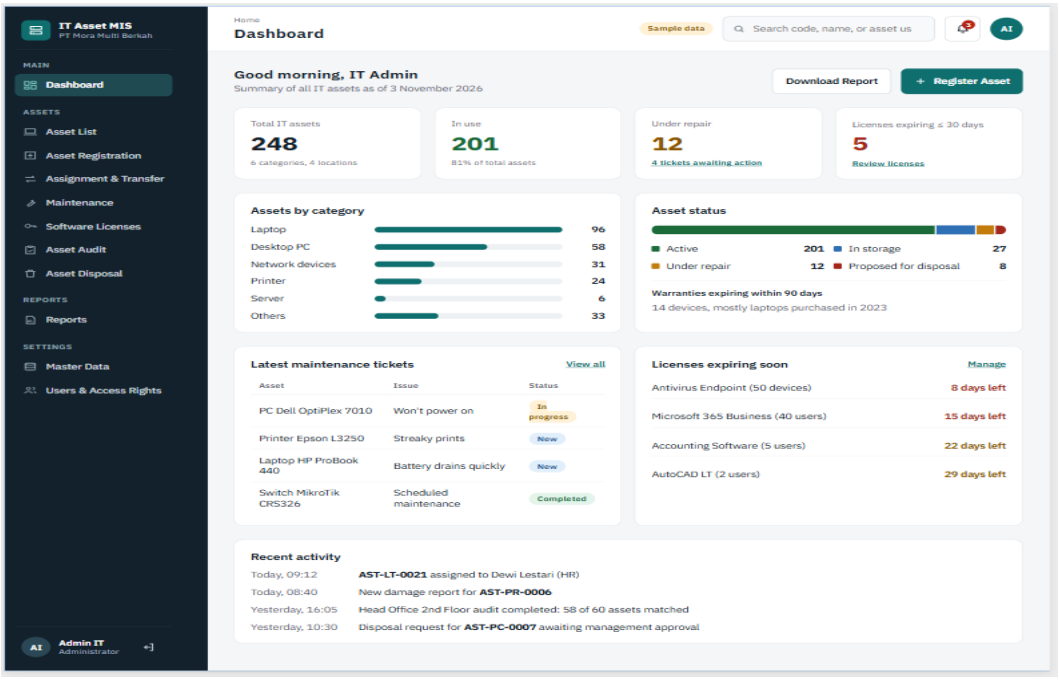


Figure 4. Main Menu After Login

The lower part of the page gives management a more detailed view for monitoring and decision-making. The Assets by category panel uses horizontal bars to compare the number of laptops, desktop PCs, network devices, printers, servers, and other equipment. The Asset status panel shows a stacked bar of active assets, assets in storage, assets under repair, and assets proposed for disposal, together with a warranty-expiry reminder. The Latest maintenance tickets table and the Licenses expiring soon list each link to their own modules, so pending issues can be followed up right away. At the bottom, the Recent activity log records the latest transactions, such as asset assignments, damage reports, audit results, and disposal requests, in time order. Together, these components give a real-time picture of every stage of the IT asset lifecycle on a single screen.

4. Asset List Interface

The figure above shows the Asset List page, which the IT Admin opens from the Assets section of the navigation sidebar. The page is the central register of all IT assets owned by PT Mora Multi Berkah. At the top are two action buttons: Export to Excel, which downloads the asset data as a spreadsheet, and Register Asset, which opens the form for recording newly acquired assets. Below them is a filter panel where users can search by asset code or name and narrow the list by category, location, and department. A row of status tabs (All, Active, Under repair, In storage, and Proposed for disposal) shows how many assets fall under each status, and the user can switch between them to see one group at a time.

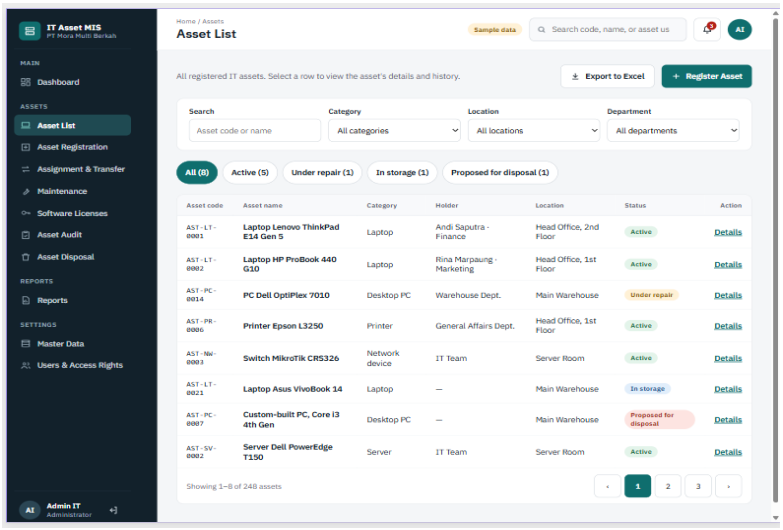


Figure 5. Asset List Interface

The main part of the page is a data table listing each asset's code, name, category, current holder, location, and status. Each status is shown as a colored label so the condition of every asset can be recognized at a glance. The Details link at the end of each row opens the asset's detail page, which shows its full specifications, procurement data, and lifecycle history. The table is paginated and shows eight records per page, with a summary of the records displayed out of the total of 248 assets. This keeps the page fast and easy to read as the asset data grows. Together, the search, filter, and status features help the IT Admin find and monitor any asset quickly, which solves the problem of scattered and hard-to-trace records in the previous manual system.

5. Users and Access Rights Interface

The figure above shows the Users and Access Rights page, which the IT Admin opens from the Settings section of the navigation sidebar. It is the only page where system accounts are created and managed. The User accounts table lists each registered user's name, department, role, last login time, and account status. The Edit link on each row lets the IT Admin update a user's details, change their role, or deactivate the account. The Add user button opens the form for creating a new account. Because users cannot register on their own, every person who accesses the system has been approved and given an account by the IT Admin.

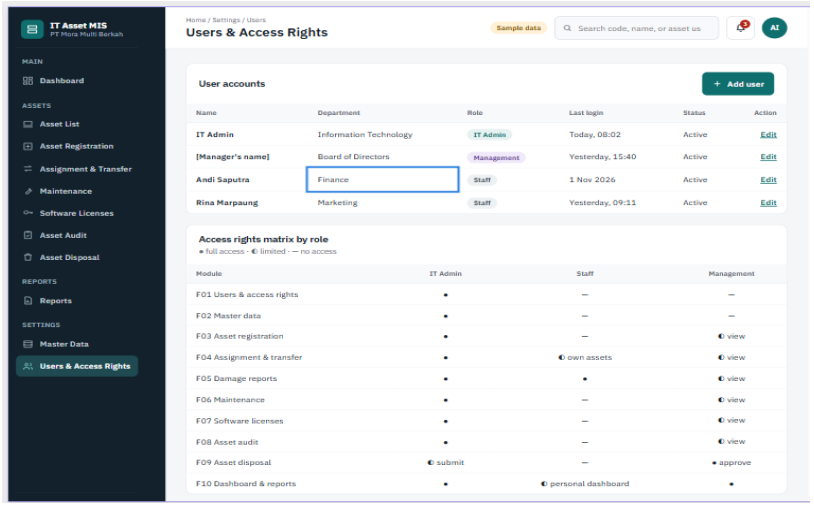


Figure 6. Users and Access Rights Interface

Below the account list, the Access rights matrix by role shows how role-based access control is applied to the ten system modules (F01–F10). Three symbols mark each role's level of access to each module: full access, limited access, and no access. The IT Admin has full access to most modules because this role manages the entire IT asset lifecycle. Staff can only report damage, view the assets assigned to them, and see a personal dashboard. Management can view the asset data and reports, and holds the sole authority to approve asset disposals submitted by the IT Admin. This separation of duties protects data integrity and makes sure that critical actions, such as disposing of company assets, go through proper authorization. It also directly carries out the security requirement set out in the system's non-functional requirements.

Conclusion

Based on the analysis, design, implementation, and testing carried out in this research, the IT Asset Management Information System at PT Mora Multi Berkah has been developed as a web-based application using the Laravel framework with the Model-View-Controller (MVC) architecture and a MySQL database. The requirements analysis, conducted through observation, interviews, and documentation, identified ten functional modules (F01–F10) that cover the entire IT asset lifecycle: procurement and registration, assignment and transfer, maintenance, software license monitoring, auditing, and disposal. These modules are supported by user management, master data, a dashboard, and reporting features. The requirements were modeled using UML diagrams, including the use case diagram, which defines three actors: IT Admin, Staff, and Management. Each actor is given access rights according to its role through role-based access control. This separation of authority, especially the rule that asset disposal requires Management approval, strengthens accountability and data integrity in asset management. These findings answer the first and second research questions.

Black Box testing with equivalence partitioning technique shows that the test scenarios produce outputs that match the expected results, indicating that the system functions according to the specified requirements. Evaluation of the System Usability Scale (SUS), completed by a number of respondents, provided an excellent average score, placing the system in the [acceptable/marginal] category. These results answer the third research question. They showed that this system replaces manual spreadsheet-based recording with centralised, traceable, and real-time asset data. They also demonstrated that this system supports faster report preparation for management decision-making. Therefore, the developed system can be considered feasible for implementation at PT Mora Multi Berkah as a solution to the asset management issues identified at the beginning of this research.

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