

# Analysis and Design of Asset and Non-Asset Lending Information Systems in the Informatics Engineering Service Unit at Astra Polytechnic

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**Abstract** – The development of information technology is developing rapidly and has a positive impact on organizational, one of which is Astra Polytechnic, especially at UPT (Technical Service Department) Informatics, which supports the operational activities of inventory lending in the form of assets and non-assets which are considered inefficient. The process of recording, submitting, and approving inventory loans is still done manually, so it takes a lot of time and is prone to errors. The process of recording inventory data is still using excel, loan applications are still made using hardcopy forms and there are no asset and non-asset reports. The aim of research is to analyze needs and design of a system for lending assets and non-assets at UPT Informatics based on Web Applications in order to overcome these problems. The design uses System Development Life Cycle (SDLC) based on Prototyping methodology until design stage. The process of analysis and design is explained using Unified Modeling Language (UML) approach. Analysis of system requirements is carried out on ongoing business processes, which are then outlined in design of asset and non-asset lending information systems, especially in documentation process to produce reports according to company needs. The results of the interviews showed that 8 people were satisfied, 5 people were neutral, and 2 people were dissatisfied.

**Keywords:** SDLC; UML; AssetInventory; DesignPrototyping; Web Application

## I. INTRODUCTION

Astra Polytechnic or better known as Astra Polytechnic or AstraTech is an educational institution under the auspices of the Astra Bina Ilmu Foundation, a subsidiary of PT Astra Internasional, Tbk, where in the business process Astra Polytechnic has several UPTs that work together, one of which is UPT Informatics that has assets and non-assets in supporting learning activities, projects and other academic activities, especially in the Informatics Management Study Program and generally all study program students, UPT employees and other departments who are given asset loans and non-asset management services. UPT Informatics has various types of assets in the form of laptops, PCs, routers, cameras, printers, LCDs, smartphones and other types of assets with a total of 3584 assets. Apart from assets, non-assets also have various types such as mice, keyboards, tables, chairs, cabinets, RAM, hard disks, sensors and many more with a total of 447 non-assets per 2021. Asset management capabilities that involve routine change activities enhance the ability of multinational companies to deal with more disruptive events, such as the global economic crisis (Coombs, 2018).

The amount of inventory owned by UPT Informatics is still recorded manually in an excel file, thus allowing for input errors which result in redundant and inconsistent data. This also has an impact on stock taking activities which experience difficulties due to asset and non-asset recording data that do not match the storage location. In addition, the existence of asset and non-asset lending activities that are not properly recorded through the system but through physical form is also the most frequently encountered problem. These problems include the frequent occurrence

of miscommunication, the absence of borrowing inventory of assets owned, the length of time needed to confirm loan approvals, to the data loss and data errors also often occur so that it requires an asset management information system that is able to handle this (Musoffa, 2022) inventory of UPT Informatics. For many years there has been debate among management about the ideal inventory management system, who should control it, who should own the decisions (Ganesh, 2020). In addition, inventory management is also an important source of operational risk, especially in terms of inventory volatility and excess inventory (Bendig, 2018).

After the process of borrowing assets and non-assets there is also a return process which is carried out when the loan process is complete, this becomes a problem when assets and non-assets are still being used by the borrower but must be returned first. and create a new loan application form to extend the asset and non-asset loan process. This becomes time-consuming when the approval process is carried out to the Head of UPT IF. In addition to the process of borrowing, extending and returning non-asset assets, the UPT admin also has difficulty directly monitoring existing inventory and ongoing borrowing and there are still many problems that are often encountered in the inventory borrowing process flow. Therefore, to overcome this problem, an information system is needed in its application to assist the process of managing inventory data and inventory borrowing transactions as expected (Sakti Pratama, 2019) so that the tracing process becomes effective and efficient with a systematically structured system (Sinulingga et al., 2022). In addition, computer-based inventory data management can eliminate problems inherent in existing manual systems (Oktaviani et al., 2019). In anticipation of increasing risk management and strengthening transparency (Salike, 2018), the risk management framework used must be reassessed to address new risks (Sharif, 2020).

From the description of the problem, it can be underlined that there are several problems as follows:

- The recording process is still manual with Microsoft Excel which causes data redundancy and other data errors.
- The process of monitoring asset and non-asset inventory takes a long time, because the data is still recorded manually.
- The process of applying for an inventory loan is still done manually through a paper loan form.

A collection of various components and procedures of information that are interconnected and work together starting from the stage of data collection, processing and storage of information to the process of distributing the information to related parties in assisting the decision-making process (Sumaryanto & Sumarna, 2022). A series of interrelated activities to achieve certain business goals that are completed sequentially or in parallel, by humans or systems, both inside and outside the organization (Dumas et al., 2021). Asset recording or data collection activities are carried out systematically, regularly and orderly. Recording will be carried out repeatedly to support the process of controlling and monitoring assets as to support effectiveness and efficiency in the running of company operations (R.

Akbar & A. Rahman, 2021).

The process, method, act of borrowing or lending all types of tangible objects, although usually more often identified with monetary loans that require the redistribution of assets over time between borrowers and debtors (Pane et al., 2020). The process of understanding how an information system can support business needs by designing the system, building it, and delivering it to users (Dennis et al., 2020). Prototype-based methodology in analyzing, designing, and implementation phases simultaneously, and all three phases are carried out repeatedly in the cycle until the system is completed, so that the user or system owner has an overview of the system development carried out (Dennis et al., 2020).

Activities represent the processes of a company, so that current business processes can be analyzed, corrected, and automated (Dennis et al., 2020). Part of the system where users interact with each other. User interface is also known as a description of the system which includes a screen display that provides navigation through the system, a screen and formular that captures data, and a system-generated report (Dennis et al., 2020). An advanced computing tool that not only provides stand-alone functions for its users but has also been integrated with enterprise databases and business applications (Pressman & Maxim, 2019) using SQL server in order to access data in tables and operate on complete tables (Ward, 2019). The design of a web-based asset and non-asset lending information system capable of carrying out processes that have been designed and meets the requirements in all aspects of usability (Tjahjanto et al., 2022).

An interface design application that runs in a browser. Figma provides all the tools needed for the design phase of a project, including vector drawing tools capable of fully illustrating, as well as prototyping capabilities (Fedorenko, 2020). An open-source application that serves to build diagramming applications and is the most widely used browser-based application in the world (Harahap, 2019). An architectural concept where there is a server that provides and manages most of the resources and services that will be consumed by clients. This type of architecture has one or more client computers connected to a central server via a network or internet connection (Rouse M., 2020).

A standard set of object-oriented diagramming techniques that aim to model system development projects from analysis to implementation (Dennis et al., 2020).

To overcome this problem, an analysis and design of an asset and non-asset lending information system was made. The design of this system is equipped with various design features such as data management features including create, update, delete, and read as well as transaction features which are also equipped with automatic report generation. So that the design of this system is expected to facilitate data management and minimize user errors.

## II. METHODS

### 2.1 Problem identification and data collection

- **Observation:** Researchers made direct observations in the work area of the Astra Polytechnic UPT Informatics team to find out the business processes of lending assets and non-assets which will then be analysed.
- **Interview:** This method is carried out to determine user needs when developing a new system or new, better features. At this stage, interviews were conducted with PIC UPT Informatics assets and non-assets as users.
- **Library Study:** Literature studies are carried out using literature such as articles, books and journals related to the business process of lending assets and non-assets used which are used as references in writing this research.

### 2.1 Design Method

Researchers also used the System Development Life Cycle (SDLC) design approach with the prototyping methodology. The prototype-based prototyping methodology in analyzing, designing, and implementing phases simultaneously, and these three phases are carried out repeatedly in the completed system cycle, so that system users have an overview of the system development being carried out (Dennis et al., 2020). In the analysis of asset and non-asset lending systems, stages are carried out starting from planning, analysis, and only up to the design stage which is marked with a red line which can be seen in Figure 1.

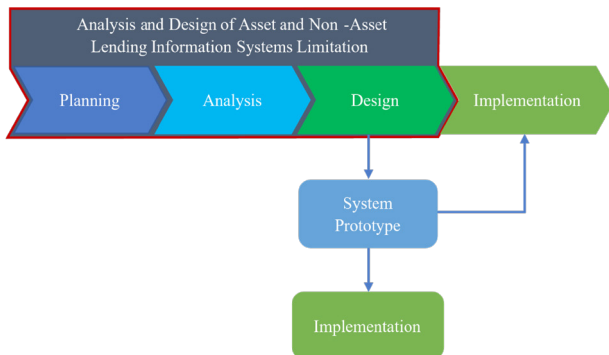


Figure 1. Methodology Prototyping

The stages of development are carried out based on the following stages:

- **Planning:** This stage is carried out by determining research topics to be analyzed and identifying problems and user needs.
- **Analysis:** At this stage, the process of analyzing system requirements, and system workflow are carried out to be used as the basis for research on problem-solving proposals.
- **Design:** In this stage, a detailed design is carried out regarding system functionality, interface design, and database design that will be applied to the information system being created.

The concept of client-server architecture also supports the design of this application, where the presentation of web applications will be provided on a server and accessed by several users/clients who need them, either locally or via

the internet. Client-Server architecture is an architectural concept in which there is a server that delivers and manages most of the resources and services that will be consumed by the client. This type of architecture has one or more client computers connected to a central server via a network or internet connection (R. Akbar & A. Rahman, 2021).

## III. RESULTS AND DISCUSSION

### 3.1 Problem Analysis

Problem analysis is used to find out the problems that occur in UPT Informatics inventory lending, after analyzing with observational research on ongoing business processes, several business processes have the potential to have problems or weaknesses as explained earlier: the inventory recording process is still carried out using excel, loan applications are still made using physical forms and require approval from the head of the relevant section, so it takes a long time (Mulyanto & Ramdani, 2019).

### 3.2 System Design Analysis

Analysis and design of asset and non-asset lending systems are carried out based on the prototyping methodology to the design stage as follows:

- **Planning:** This stage is carried out by determining research topics to be analyzed and identified problems and user needs. Identification is done by means of observation, interviews, data collection and literature study to get solutions to these problems. In addition, a timeline for project work was also made to determine the expected target and time limit.
- **Analysis:** At this stage, an analysis of the results of interviews, observations, data collection, and literature studies is carried out to serve as a basis for research on the proposed problem. This is also demonstrated by the existence of business process improvements to the asset and non-asset lending systems that will be designed. Based on the results of the analysis, this system has three required users, namely User, PIC, and Head of UPT.

Based on the results of the problem analysis, there are proposed solutions for each problem, shown in Table 1.

Table 1. Problem Analysis and Proposed Problem Solving

No	Problem Analysis	Proposed Problem Solving
1	Asset and non-asset data recording is still manual with Microsoft Excel.	<ul style="list-style-type: none"> <li>• Asset and Non-Asset Data Management Module</li> <li>• Asset and Non-Asset Category Data Management Module</li> </ul>
2	Loan applications still use physical forms.	<ul style="list-style-type: none"> <li>• Asset and Non-Asset Lending Management Module (Features for Making Lending Forms, Features for Submission of Loan Forms, and Approval of Asset and Non-Asset Loans)</li> <li>• User Data Management Module</li> </ul>
3	There is no process for applying for an extension of lending assets and non-assets.	<ul style="list-style-type: none"> <li>• Asset and Non-Asset Renewal Management Module (Feature for Submission of Renewal, Feature for Approval for Renewal of Assets and Non-Assets)</li> </ul>

4	Submission of returns on assets and non-assets that still use the physical form.	• Asset and Non-Asset Return Management Module (Return Submission Feature, Asset and Non-Asset Return Approval Feature)
5	There are no reports of asset and non-asset lending.	• Asset and Non-Asset Report Management Module

- Design: This stage is designed using Unified Model Language (UML) diagrams, including Use Case Diagrams, Use Case Descriptions, Activity Diagrams, CRC Cards, Class Diagrams, System Sequence Diagrams, interface display design of asset and non-asset lending information systems as well as database design described in the form of a Physical Data Model (PDM). This design aims to be able to assist companies in searching and printing asset data, asset data management is fast and accurate, and information about asset reports can be accessed easily, quickly and efficiently (Pressman & Maxim, 2019).

Based on user needs, a description is carried out through UML diagrams as follows:

Use Case Modelling diagram used to describe the main functions of the system and the types of users who will interact in the system (Dennis et al., 2020). In the asset and non-asset lending system, thirty-seven use cases explain each transaction according to user needs.

The process flow in the Use Case Description will be used as a reference in making Activity Diagrams to describe the actions taken by the user and will be used as a reference in making subsequent diagrams. Of the 37 use case descriptions, 37 activity diagrams were obtained.

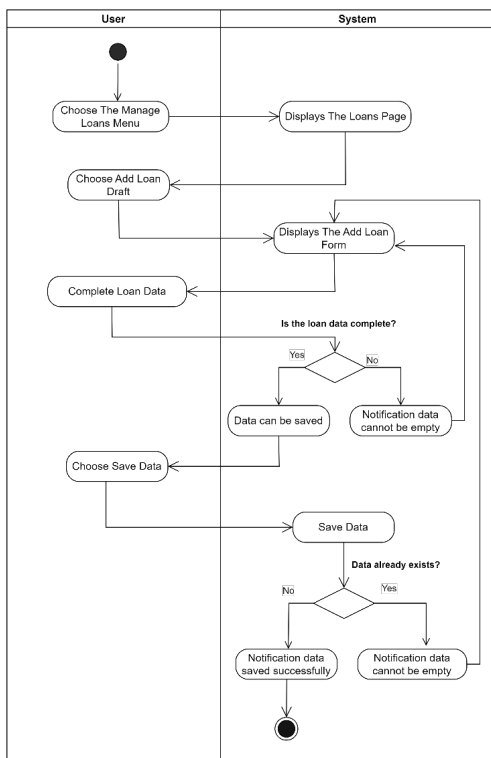


Figure 2. Activity Diagram Add Loan Draft

Based on the previous use case description, objects will be identified utilizing analysis and described in the form of CRC Cards. At this stage, it will produce twelve CRC Cards, show in figure 3.

<b>Front:</b>			
<b>Class Name:</b> Inventory	<b>ID:</b> 07	<b>Type:</b> Concrete	
<b>Description:</b> Inventory Data		<b>Associated use case:</b> PA-1, PA-3, PA-4	
<b>Responsibility:</b>		<b>Collaborator:</b>	
Create Loan Draft		User, LoanTransDet	
View Loan Draft		LoanTransDet	
Update Loan Draft		LoanTransDet	
Delete Loan Draft		LoanTransDet	
Send Loan Draft		User, LoanTransDet	
Get Loan Data		User, LoanTransDet	
Approval Update		User	
Status Update		User	
<b>Back:</b>			
<b>Attribute:</b>			
loanDate	Datetime	approvalByHead	Varchar(20)
reason	Varchar(200)	approvalDateHead	Datetime
approvalByPIC	Varchar(20)	status	Integer
approvalDatePIC	Datetime		
<b>Relationship:</b>			
<b>Generalization (a-kind-of):</b>		-	
<b>Aggregation (has part):</b>		-	
<b>Other Association:</b>		User, LoanTransDet	

Figure 3. Lending CRC Cards

The object analysis in the previous CRC Cards will be described as a class consisting of attributes, operations, and relationships between classes. In this system, there are 10 classes and five additional classes, namely class Role, Department, User, Location, Category, Inventory, LoanTransaction, ReturnTransaction, ExtentionTransaction, LoanTransactionDetails, ReturnTransaction Details, and ExtentionTransactionDetails.

Objects that are connected in the use case diagram will be illustrated with a sequence diagram so that the interactions between objects will be seen clearly and simplify the workflow of the system. There are 37 sequence diagrams in this system.

The results of the previous analysis and diagrammatic depiction will be used for designing the user interface. User Interface is part of the system where users interact with each other. The user interface is also known as an overview of the system which includes screen displays that provide navigation through the system, screens, and formulas that capture data, and system-generated reports (Dennis et al., 2020). The design of this information system is carried out through wireframe and mock-up display designs. Wireframes are made to give users an idea of the layout of each system view.

To access the Asset and Non-Asset Loan Information System, users need to enter their primary number, password, and complete a captcha verification. Then, click the 'enter' button to access the corresponding page according to their role. After that, they will be redirected to the main system dashboard, where users can view a summary of the asset and non-asset loan processes.

Display the lending form that must be inputted by the user when borrowing assets and non-assets, such as borrower's name, loan date, return date, about, information, inventory UPT to be borrowed, inventory type, inventory, compensation, etc.

Then, after creating the wireframe, the next step is to develop the design mockup based on the appearance of the wireframe or the changes from the wireframe to high-fidelity design, show in figure 4.

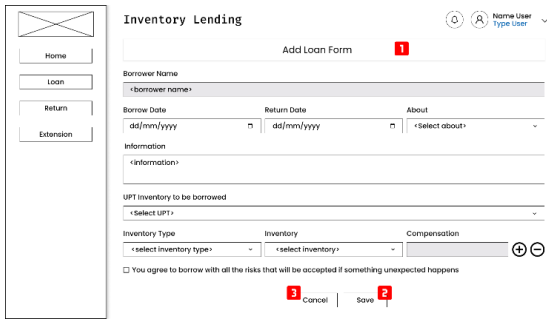


Figure 4. Wireframe Page Add Borrowing Draft

The initial menu user interface design generally consists of a login page with an additional main page. All menus in this system can be accessed by logging in first, show in figure 5.



Figure 5. Login Page User Interface Design

This page is used to view graphically and visually various types of lending data and can generate reports on the selected data, show in figure 6.

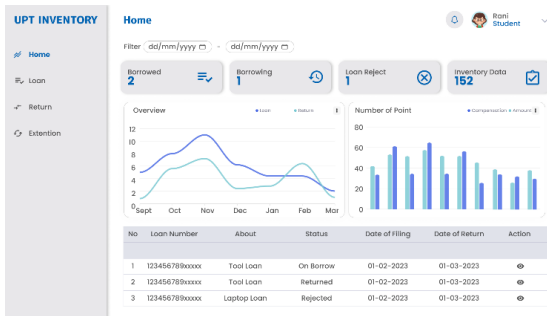


Figure 6. Home Page User Interface Design

The page used to display asset and non-asset lending transaction data, show in figure 7.

No	Loan Number	About	Status	Date of Filing	Date of Return	Action
1	123456789xxxx	Tool Loan	Draft	01-02-2023	01-03-2023	
2	123456789xxxx	Tool Loan	On Borrow	01-02-2023	01-03-2023	
3	123456789xxxx	Laptop Loan	Returned	01-02-2023	01-03-2023	
4	123456789xxxx	Laptop Loan	Rejected	01-02-2023	01-03-2023	
5	123456789xxxx	Laptop Loan	Draft	01-02-2023	01-03-2023	

Figure 7. Loan List Page User Interface Design

The page used by users when they want to see lending transactions in more detail, show in figure 8.

No	Inventory Type	Inventory Name	Amount	Status
1	Monitor	LCD04071	1	On Borrow
2	Screwdriver	K901 Flower Screwdriver	1	On Borrow
3	Screwdriver	K902 Flower Screwdriver	1	On Borrow

Figure 8. Loan Detail Page User Interface Design

The page used when the user will borrow assets and non-assets, show in figure 9.

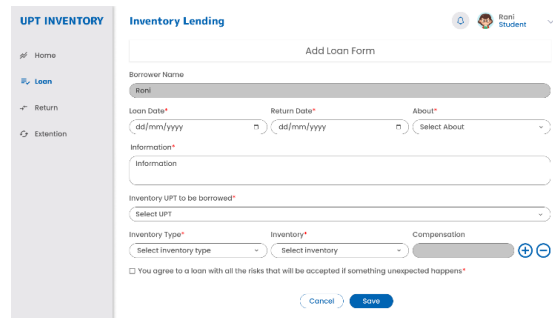


Figure 9. Add Loan Page User Interface Design

After creating the design mockup, another interview was conducted to determine the number of people satisfied and dissatisfied with the design and system functionality. The results can be seen in the figure 10.

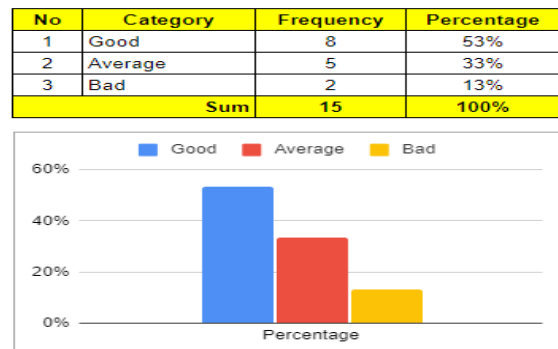


Figure 10. Satisfaction Display Design Mockup Chart

The results above indicate that 8 people are satisfied, 5 people are neutral, and 2 people are dissatisfied. It can be concluded that the design model rendering has been approved and it is possible to proceed to the next stage, which is implementation.

## IV. CONCLUSION

Based on the information system design that has been done, the following conclusions can be drawn:

- The design of a web-based asset and non-asset lending information system is an effective solution to the problems of asset and non-asset lending process activities that are currently being carried out manually, so as to improve service quality and

mitigate the human error process.

- Procedures for applying for loans, extensions, returning assets, and non-assets can be properly documented and stored in the information system for borrowing assets and non-assets so that assets and non-assets borrowed can be properly monitored for historical processes and their existence.
- Management of Astra Polytechnic can easily access reports related to asset and non-asset data on the Dashboard menu. The process of making reports by asset and non-asset PICs was previously done manually by re-entering and processing data in Excel files.
- With the existence of the design plan, process flow, and data structure of asset and non-asset lending, it can already fulfill the needs of Politeknik Astra. This is evidenced by the results of interviews with several respondents who expressed their satisfaction.

The suggestions that can be given after analyzing and designing an information system for lending assets and non-assets are as follows:

- Create an asset and non-asset lending information system that can be integrated with Astra Polytechnic's LDAP (Lightweight Directory Access Protocol).
- Adding a reminder module to the asset and non-asset lending information system to inform that the duration of the loan will expire or has expired, so that asset governance can be managed properly.
- In this design phase, there has been no implementation into the actual system yet. It is expected to be able to apply it to the system and have it function properly.

## REFERENCES

- Sharif, A., Aloui, C., & Yarovaya, L. (2020). COVID-19 pandemic, oil prices, stock market, geopolitical risk and policy uncertainty nexus in the US economy: Fresh evidence from the wavelet-based approach. *International Review of Financial Analysis*, 70, 101496. <https://doi.org/10.1016/j.irfa.2020.101496>
- Bendig, D., Brettel, M., & Downar, B. (2018). Inventory component volatility and its relation to returns. *International Journal of Production Economics*, 200, 37–49. <https://doi.org/10.1016/j.ijpe.2018.03.012>
- Dennis, A., Wixom, B. H., & Tegarden, D. (2015). System Analysis & Design An Object -Oriented Approach with UML 5th Edition. In *Information and Software Technology*.
- Dumas, M., Rosa, M. L., Mendling, J., & Reijers, H. A. (2021). *Fundamental Manajemen Proses Bisnis*. Penerbit Andi.
- Fedorenko, E. (2020). *Designing in Figma: The Complete Guide to Designing with Reusable Components and Styles in Figma*.
- Harahap, S. H. (2019). Analisis Pembelajaran Sistem Akuntansi Menggunakan Draw.Io Sebagai Perancangan Diagram Alir. *Prosiding Seminar Nasional Multidisiplin Ilmu Universitas Asahan 2018, November*.
- Ganesh, H. R., Aithal, P. S., & Kirubadevi, P. (2020). Integrated Inventory Management Control Framework. *International Journal of Management, Technology, and Social Sciences*. <https://doi.org/10.47992/ijmts.2581.6012.0087>
- Musoffa, M. Z., Sasmita Susanto, E., & Mulyanto, Y. (2022). Sistem Informasi Manajemen Aset Berbasis Web di Universitas Teknologi Sumbawa. *Jurnal Informatika Teknologi Dan Sains*, 4(1), 42–51. <https://doi.org/10.51401/jinteks.v4i1.1530>
- Mulyanto, Y., & Ramdani, F. (2019). Aplikasi Pengelolaan Inventaris Barang di SMK Negeri 1 Plampang Berbasis Web. *Jurnal Informatika, Teknologi Dan Sains*, 1(2). <https://doi.org/10.51401/jinteks.v1i2.419>
- Oktaviani, N., Widiarta, I. M., & Nurlaily. (2019). Sistem Informasi Inventaris Barang Berbasis Web Pada SMP Negeri 1 Buer. *Jurnal Informatika, Teknologi Dan Sains*, 1(2). <https://doi.org/10.51401/jinteks.v1i2.422>
- Pane, S. F., Zamzam, M., & Fadillah, M. D. (2020). Membangun Aplikasi Peminjaman Jurnal Menggunakan Aplikasi Oracle Apex Online. In *Membangun Aplikasi Peminjaman Jurnal Menggunakan Aplikasi Oracle Apex Online*.
- Sakti Pratama, I., Nawassyarif, & Aliyah, J. (2019). Pengembangan Sistem Informasi Sarana dan Prasarana di Universitas Teknologi Sumbawa (UTS) Berbasis Web. *Jurnal Informatika, Teknologi Dan Sains*, 1(1). <https://doi.org/10.51401/jinteks.v1i1.372>
- Pressman, R. S. (2009). Software Engineering A Practitioner's Approach 7th Ed - Roger S. Pressman. In *Software Engineering A Practitioner's Approach 7th Ed - Roger S. Pressman*. <https://doi.org/10.1017/CBO9781107415324.004>
- Akbar, R., & Rahman, A. (2021). Pembuatan Aplikasi Web dan Mobile Untuk Sistem Informasi Pengelolaan Aset dengan QR Code (Studi Kasus: PT Kereta Api Indonesia (Persero) Divisi Regional II Sumatera Barat). *Jurnal Nasional Teknologi Dan Sistem Informasi*, 6(3). <https://doi.org/10.25077/teknosi.v6i3.2020.129-138>
- Salike, N., & Ao, B. (2018). Determinants of Bank's Profitability: Role of Poor Asset Quality in Asia. *China Finance Review International*, 8(2). <https://doi.org/10.1108/CFRI-10-2016-0118>
- Sinulingga, Y. A., Sihombing, V., & Irmayani, D. (2022). Application of Analytical Hierarchy Process Method in Asset Management System as Asset Tracing Optimization. *Sinkron*, 7(1). <https://doi.org/10.33395/sinkron.v7i1.11260>

- Sumaryanto, & Sumarna, S. (2022). Perancangan Aplikasi Inventaris Barang Milik Negara Berbasis Web Pada Deputi Bidang Pencegahan BNN. *Jurnal Informatika Teknologi Dan Sains*, 4(2), 59–65. <https://doi.org/10.51401/jinteks.v4i2.1552>
- Ismail. (2018). Sistem Informasi Monitoring Inventory IT Aset (SIMONAS) Berbasis Web Pada PT. Metrocom Global Solusi Jakarta. In *Jurnal dan Penelitian Teknik Informatika* (Vol. 3, Issue 1).
- Rouse M. (2020). *What is Client/Server Architecture? - Definition from Techopedia*. Techopedia.Com. <https://www.techopedia.com/definition/438/client-server-architecture>
- Tjahjanto, T., Arista, A., & Ermatita, E. (2022). Information System for State-owned inventories Management at the Faculty of Computer Science. *Sinkron*, 7(4). <https://doi.org/10.33395/sinkron.v7i4.11678>
- Ward, B. (2019). *SQL Server 2019 Revealed: Including Big Data Clusters and Machine Learning*. Germany: Apress
- Coombs, W. T., & Laufer, D. (2018). Global Crisis Management – Current Research and Future Directions. *Journal of International Management*, 24(3), 199–203. <https://doi.org/10.1016/j.intman.2017.12.003>