

The system development life cycle model implementation on information system of performance reporting IT asset case study: PT Kereta Api Indonesia (Persero)

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Abstract: The asset performance monitoring should be done to find out and review the reported data whether it has been in line with the reality or not. It is important to identify the occurring problems to be immediately handled. The information system development aimed to build the existing system. Thus, it will be more effective and efficient to produce information. This research applied the System Development Life Cycle (SDLC) with Waterfall Model to design, create, maintain the information and process the system. During the creation of this information system, the authors applied the PHP language program, Framework Codeigniter, MySQL, database, and Visual Studio Code as the editorial codes. The implementation of the SIPERITA application, could be used excellently were proven effective and efficient because the application facilitated the monitoring activities by providing single application access in promoting a checking process of the condition asset then the user administrator can see a diagram of the monitoring results on the home page so that if there is a problem with the asset, direct action can be taken and with this application, users can print the reports based on daily, monthly, and annually.

Keywords: Information, SDLC, SIPERITA Application, System

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Introduction

The asset condition monitoring process in the IT Operation Unit of the PT Kereta Api Indonesia has been using the *Google Form* feature as the data input. Then, the data is processed into a monthly report. The report is usually done manually with Microsoft Excel. It takes time and is not efficient to work on them [1].

This research [2] explains that a monitoring process will produce a monthly recapitulated data report. The system has the purpose to make the data accurate and the information clear. Thus, the data recapitulation and report processes will run smoothly and prevent further data duplication. The applied method [3] was Waterfall in which the original concept of the method is to see problems systematically and structurally from the beginning until the end. By creating new data supported with an asset management-data-based system, the information of the corporate asset report would be accessible quickly, easily, and efficiently.

A study by [4] states that the use of information technology could maximize the web-based inventory system application that could be accessed by the central official party and branch offices. This inventorying process consists of noting, storing, and reporting from the branch offices. It could also notice each branch office inventory data quickly and accurately. In this research, the created application was done with Macromedia Dreamweaver, PHP language program, and MySQL database.

On the other hand, a study by [5] found that asset management could be optimal by using an information system. The applied method in this research was a subject-oriented approach

with UML (Unified Modeling Language). It was by using a case diagram, class diagram, and activity diagram to facilitate understanding a designed system. This research produced an information system prototype of asset management. It was implemented at the BMKG office (Meteorology, Climatology, and Geophysics Agency) in Jambi.

The management asset is an art and knowledge to combine the resource management. It consists of planning the asset need, inventorying, legal audit of operating, maintaining, removing, and effective and efficient asset transfer [6][7]. A study by [8] found that the use of the CICT Asset Inventory and Management system facilitated the monitoring of the asset. Monitoring had a purpose to conduct research, review, identify problems, and measure progress [9]. The other website applications had been developed to support the main website application [10] [11][12].

Based on the explanation, this research aimed to apply a website-based application, the application name is Information System of Reporting IT Asset (SIPERITA), at the IT Operation Unit of the State-Owned Kereta Api Indonesia.

Methodology

The Research Stages

In this research, the authors applied the System Development Life Cycle (SDLC) with Waterfall Model. According to [13], the life cycle of this system has functions to describe the main stages and steps of each phase. The stages of the Waterfall Model could be seen in Figure 1.

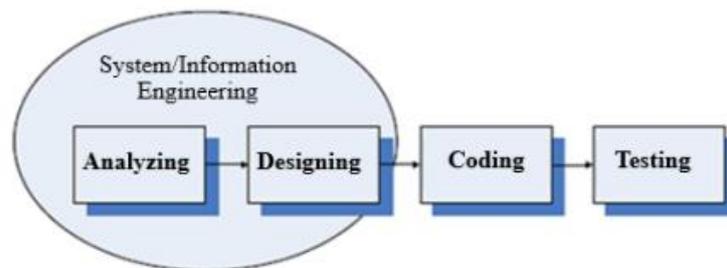


Figure 1. Waterfall model

1. The Need Analysis
This stage was a process to collect the needed data. It was to specify the functional and non-functional needs during the asset performance monitoring processes. It included data input monitoring, report print, and other management features. This system allowed the user to carry out the monitoring process easier than the previous system.
2. The System Design
This stage was done to design the website-based application, SIPERITA, with a Unified Modeling Language planning model. This stage facilitated the logical understanding realization of the designed system by determining the detailed specification of each information system based on the analytical stage results.
3. The Program Code Creation
This stage was done by applying the design to the software program. The results of this stage were in line with the arranged design during the designing stage.
4. The Testing System
This stage was done by using Black Box and Beta tests. The test was the stage to check the conditions of a system whether the output had been in line with the functional need specification.
5. The Supports and Maintenance
The support and maintenance stages were the last stages concerning the program utility and adjustment. The activities consisted of revision, revising, and developing the implemented application.

Data Collection Methods

The method of collecting data related to the asset performance monitoring at the IT Operation unit applied several methods. They were:

Field Research

The researchers obtained the data by going into the field and conducted interviews and observation.

1. Interview
The researchers interviewed the employees of the IT Operation unit to obtain accurate and relevant data. Thus, they could create an appropriate information system plan based on their needs.
2. Observation
The researchers observed the asset performance monitoring process directly at the IT Operation unit of the State-Owned Kereta Api Indonesia.

Document Analysis

It was an activity to collect information about the required documents in a system. The document includes an ISO checklist form and a 2019th performance report. The purposes of the document analysis were to find out and understand what documents were needed and used in a running system.

Results and Discussions

The Need Analysis

The need data of the website-based application production, SIPERITA, for the IT Operation unit of the State-Owned Kereta Api Indonesia consisted of functional needs dan non-functional needs.

Functional Need

The functional need of an information system could be seen in Table 1.

Table 1. Functional Need

Number	Administrator	Executor
1	Login function for administrator	Login function for the executor
2	The data user management function	The asset performance monitoring data input
3	The asset performance monitoring data input	The data user management function
4	The asset performance monitoring report print	

Non-Functional Need

The non-functional need of the information system produced the following details.

Table 2. Non-Functional Need

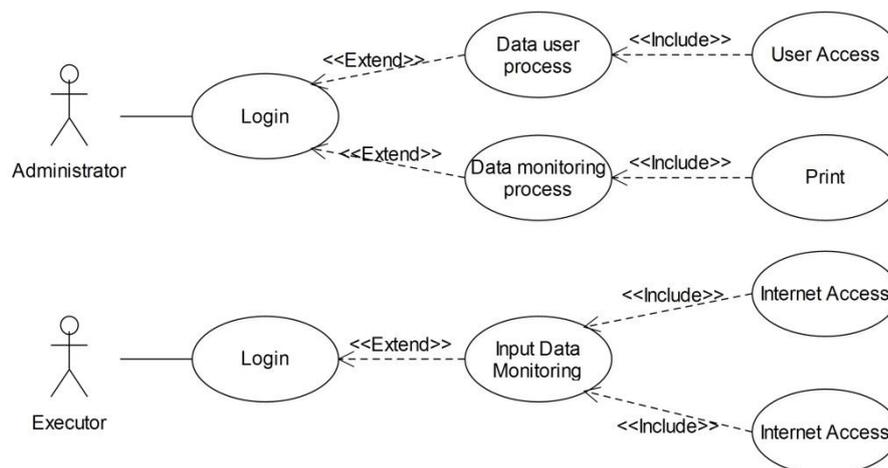
Number	Data	Criteria
1	The data monitoring needs	Daily generator set, weekly generator set, UPS and PAC
2	The data user needs	Administrator and Executor
3	The need for the daily asset generator monitoring criteria information	Type of asset, date and time monitoring, volt charger, engine battery, water, oil, fuel daily tank, frequency, indicator, and storage tank
4	The need for the weekly asset generator monitoring criteria information	Type of asset, weekly period, the executor name, date and time monitoring, oil press KPA, water temp °C, fuel meter, hertz engine, RPM engine, and hours engine
5	The need for UPS monitoring criteria information	Type of asset, date and time monitoring, AC temperature, AC humidity, room temperature, room humidity, and internal service indicator
6	The need for PAC monitoring criteria information	Type of asset, date and time monitoring, UPS input voltage, UPS output voltage, frequency, battery room temperature, capacity module installed, capacity KVA by module, and total capacity KVA
7	The asset performance report information	Daily report and monthly report of asset performance

The Designing

The system design of the SIPERITA application used the User Case Diagram, Activity Diagram, Sequence Diagram, and Class Diagram [14].

The Use Case Diagram

The application SIPERITA has two actors, the administrators, and the executors. The administrator is the user who operates the server and the executor is the user who becomes a client and sends data to the server. Figure 2 is the description of the SIPERITA application.

**Figure 2.** Use case diagram

The Administrator and the Executor users have the facility to enter into their respective systems. The Administrator user has the authority to create and change user data for system users. The Administrator user has the authority to view, modify and delete monitoring data and print the report. The Executor user can only add the asset monitoring data.

Activity Diagram

Figure 3 shows several data monitoring management that consists of adding, changing, and removing the asset performance monitoring data.

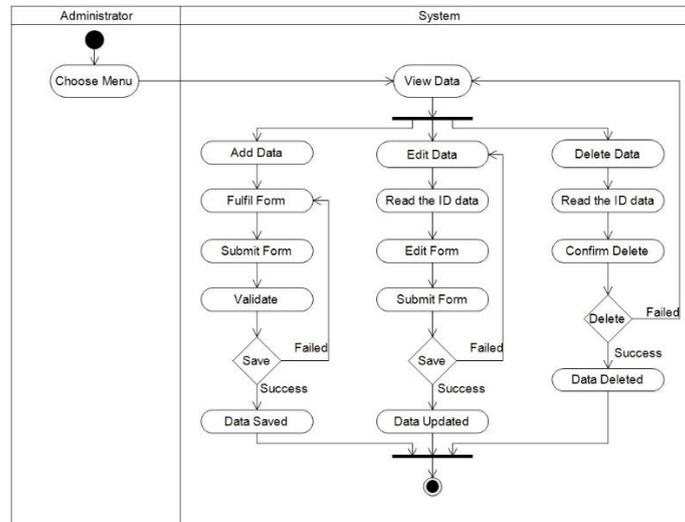


Figure 3. The activity of the data monitoring process

The Sequence Diagram

Figure 4 explains how the executor users added the data monitoring and the administrator users changed, removed, and printed the data monitoring.

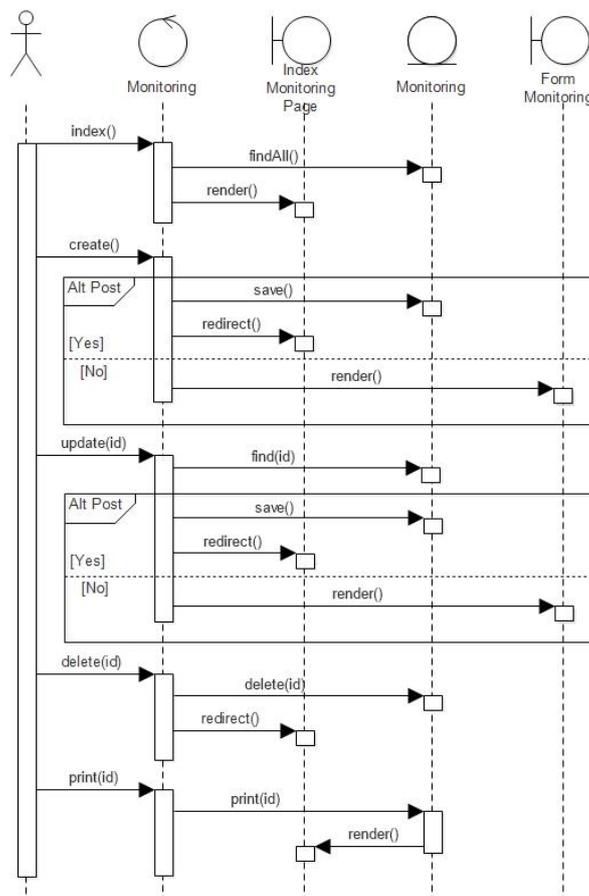


Figure 4. The sequence diagram of the data monitoring process

Class Diagram

This diagram is a connection of the classes and the explanations of each class detail within a design model of a system. It also shows the entity's regulations and responsibilities to determine the system's behavior. Figure 5 portrays the *Class Diagram* design of the SIPERITA application.

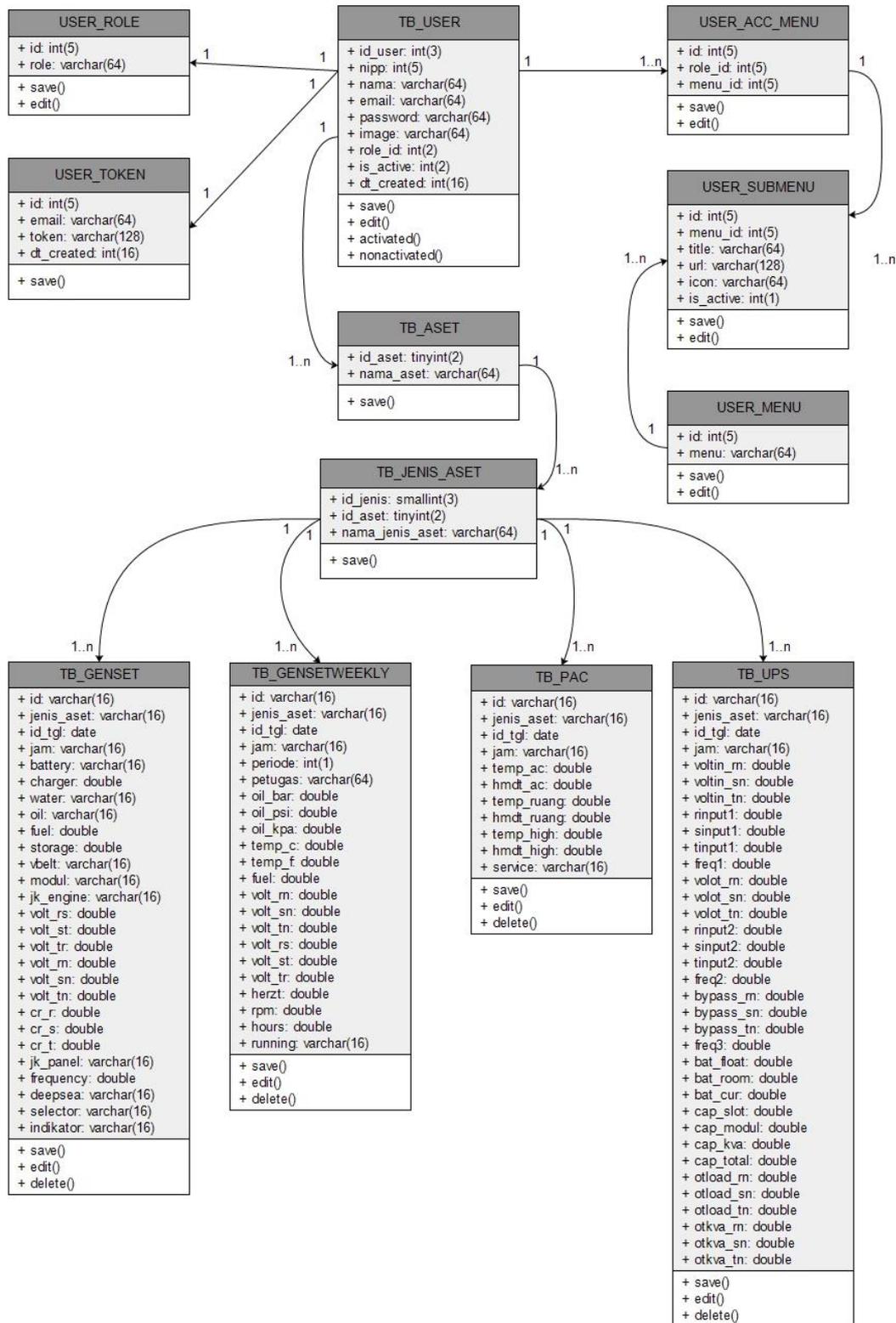


Figure 5. Class diagram

Implementation

The system implementation at this stage was a program coding creation process of the previously defined system plan results. The display of the program would be used by the users to interact with the established information system. During the program creation, the applied language programs were *PHP, framework CodeIgniter, MySQL as the database, and Microsoft Visual Code Studio as the editorial code* [15]. The applied system was used as the measurement or the test of the created program that was already established for further development [16].

Administrator Page

The initial login page display for all user levels is shown in figure 6. When the NIPP is not registered, it will display the warning. Figure 7 shows the main homepage of the administrator, on this page will appear a diagram of the results of asset monitoring. As illustrated in figure 7, four menus consist of Home, Report, Print of Report, and the User Menu.

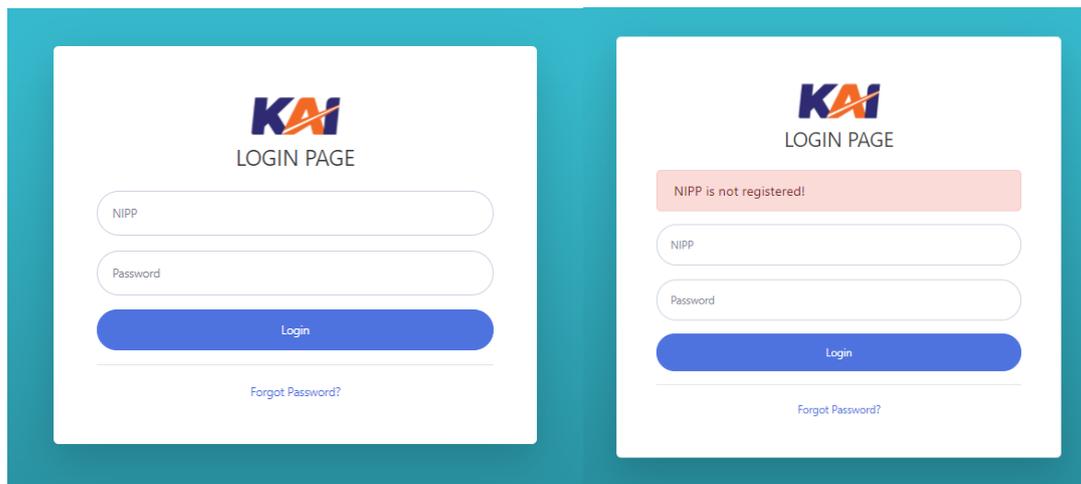


Figure 6. Login page



Figure 7. The administrator homepage

On the report page, the administrator user could see the data monitoring and asset based on the provided filters. They were inputted in the filter adjustment column as shown in figure 8. Meanwhile on this page also possible to edit or change one of the data monitoring. Figure 9 shows the page for editing data and it will display the alert when successfully edited. Figure 10

shows the filter type of the data that will be print out. This page was used to print the data monitoring stored in the *database*. The administrators had to select the type of the preferred assets to be printed. The report could be printed based on the dates, months, or years. The data user page showed the user lists in the SIPERITA application. As illustrated the figure 11, on this page the administrators could add the new users, non-activated users, and activate users.

No	Jenis PAC	Tanggal	Jam Pengecekan	Temperatur Unit AC	Humidity Unit AC %	Temperatur Ruang	Humidity Ruang %	Temperatur High	Humidity High %	Service Internal Indicator	Action
1	PAC 1	2020-10-01	20:57	22	48	19	52	27	23	Normal	Edit Hapus
2	PAC 1	2020-10-02	08:28	23.2	47	20	51	27.5	23	Normal	Edit Hapus
3	PAC 1	2020-10-05	08:37	23	46	20	50	27.2	23	Normal	Edit Hapus
4	PAC 1	2020-10-09	09:00	26	43	26	45	27.5	26	Normal	Edit Hapus

Figure 8. The report page

Figure 9. Edit data page

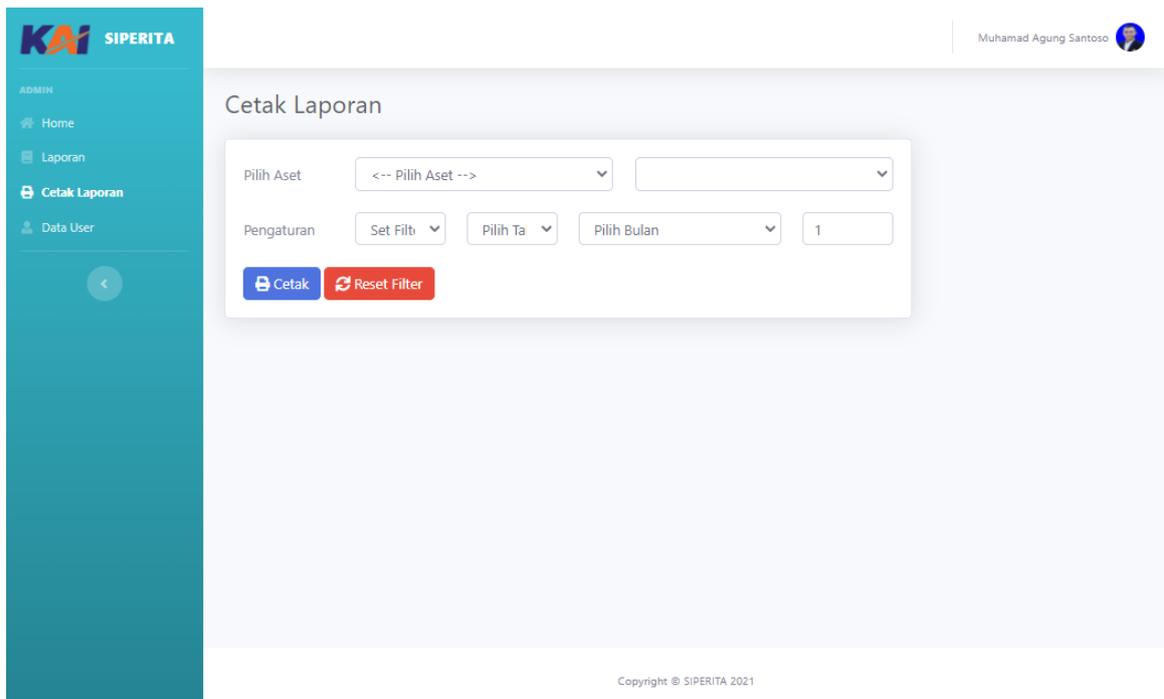


Figure 10. The data report printing page

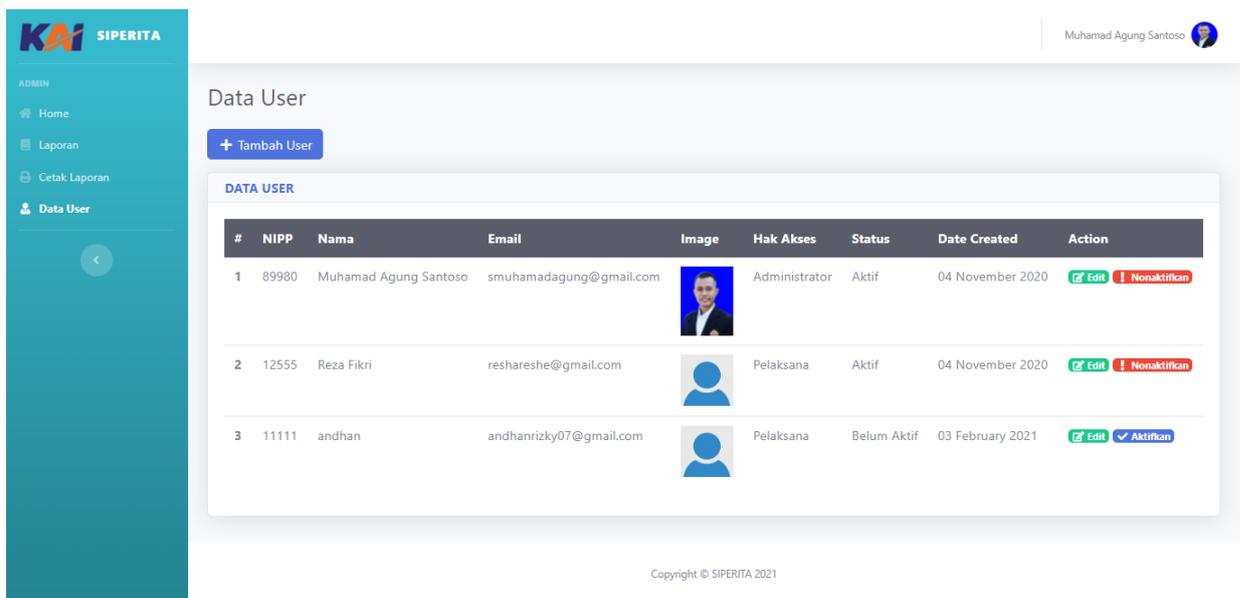


Figure 11. The data user page

Executor Page

Figure 12 is a page when someone successfully logged in as an executor and will display the homepage. On this page, they can view the adding data page has the asset lists that can be monitored by this information system. By selecting the monitored asset, the input form of data monitoring would appear based on the criteria of each asset as shown in the following figure 13. When the data is successfully added, it will display the alert.

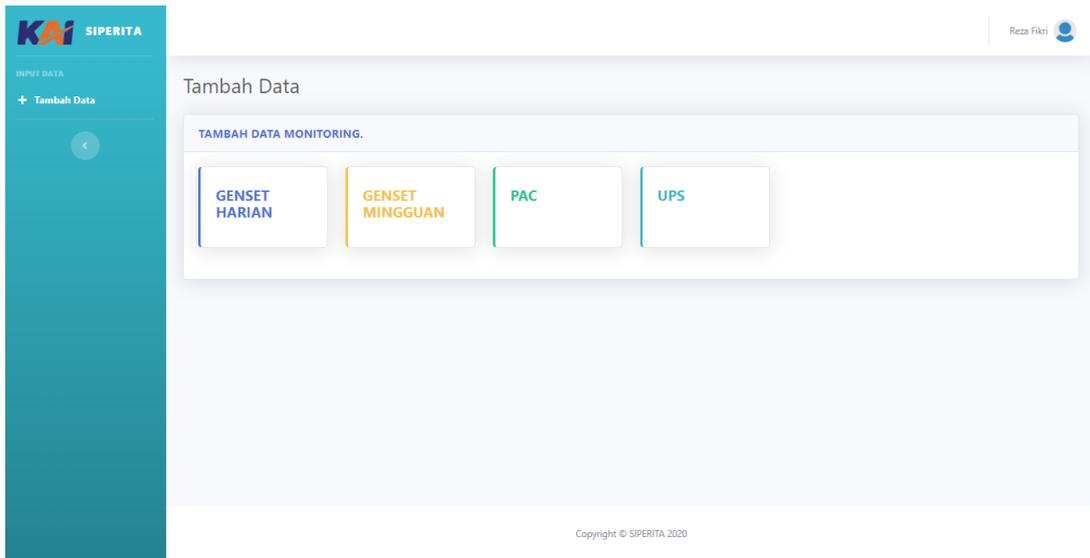


Figure 12. The executor homepage

Tambah Data

Data berhasil disimpan!

SILAHKAN LENGKAPI DATA BERIKUT.

PAC*
<--Pilih Jenis PAC-->

TANGGAL*
04/29/2021

WAKTU*
08:17:33 PM

TEMPERATUR UNIT AC*
Temperatur Unit AC

HUMIDITY UNIT AC%*
Humidity Unit AC

TEMPERATUR RUANGAN*
Temperatur Ruangan

HUMIDITY RUANGAN%*
Humidity Ruangan

TEMPERATUR HIGH*
Temperatur High

HUMIDITY HIGH%*
Humidity High

SERVICE INTERNAL INDICATOR*
<--Pilih-->

Simpan Data

* required fields

Figure 13. The adding data page

The Testing System

The test carried out for the respondents about the functionality, interface, and system utility was done with a questionnaire. It consisted of the respondents' statements and consents, then user satisfaction ratings are measured using the Likert Scale method [17]. The Siperita application users need to fill in nine questions and were filled in by ten respondents. The statements are shown in Table 3. In this study, there are five Likert scales used as shown in Table 4 and the interval value response categories shown in Table 5.

Table 3. Statements for the respondents

Number	Statements
1	The easiness to operate the application
2	The convenience to use the application in general
3	The application suitability to improve the asset monitoring process effectiveness
4	The time efficiency for asset monitoring process compared to the previous system
5	The application suitability to print the report
6	The accuracy of application utility based on the use
7	The application suitability based on the user access rights
8	The accuracy of the button and menu functions with the preferred targets
9	The accuracy of the displayed message (successful or fail)

Table 4. Likert scale

Variable	Response Categories
1	Strongly disagree
2	Disagree
3	Neither agree nor disagree
4	Agree
5	Strongly agree

Table 5. Classification based on interval value

Percentage	Response Categories
0% - 19.99%	Strongly disagree
20% - 39.99%	Disagree
40% - 59.99%	Neither agree nor disagree
60% - 79.99%	Agree
80% - 100%	Strongly agree

Based on the results of beta testing the users give 88.67%. So, it can be concluded that the respondents "totally agree" that the SIPERTA application was feasible to implement because of the ease in carrying out the monitoring process.

Conclusion

Based on the results and discussion, the implementation of the SIPERITA application, in the IT Operation unit of the PT Kereta Api Indonesia (Persero) could be used excellently. With the website-based application, it was because the application facilitated the monitoring activities by providing single-application access. Then the user administrator can see a diagram of the monitoring results on the home page so that if there is a problem with the asset, direct action can be taken. In addition, it could improve the effectiveness and efficiency in promoting the asset condition monitoring process and creating the reports.

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References

- [1] M. A. Santoso, R. Fiati, and R. Nindiyasari, *Sistem Informasi Performance Reporting IT Asset (SIPERITA) Pada Unit IT Operation PT Kereta Api Indonesia (Persero)*. Kudus: Universitas Muria Kudus, 2020.
- [2] G. T. Mardiani, "Sistem Monitoring Data Aset Dan Inventaris PT Telkom Cianjur Berbasis Web," *Komputa J. Ilm. Komput. dan Inform.*, vol. 2, no. 1, pp. 1–6, 2013.
- [3] Suparni and Hadiyansyah, "Sistem Informasi Monitoring Inventory IT Aset (SIMONAS) Berbasis Web Pada PT. Metrocom Global Solusi Jakarta," *J. Penelit. Tek. Inform.*, vol. 3, no. 1, pp. 91–98, 2018.
- [4] M. Tabrani and E. Pudjiarti, "Penerapan Metode Waterfall Pada Sistem Informasi Inventori PT Pangan Sehat Sejahtera," *J. Infokar*, vol. 1, no. 2, pp. 30–40, 2017.
- [5] P. R. Sari and J. Devitra, "Analisis Dan Perancangan Sistem Informasi Manajemen Aset Pada Kantor Badan Meteorologi, Klimatologi Dan Geofisika (BMKG) Provinsi Jambi," *J. Manaj. Sist. Inf.*, vol. 2, no. 3, pp. 573–591, 2017.
- [6] A. G. Sugima, *Manajemen Aset Pariwisata: Pelayanan Berkualitas agar Wisatawan puas dan Loyal*, 1st ed. Bandung: Guardaya Intimarta, 2013.
- [7] A. D. Setiawati and I. M. D. J. Sulastra, "Rancang Bangun Sistem Informasi Inventory Berbasis Client Server pada PT Arpan Bali Utama di Denpasar," *Matrix J. Manaj. Teknol. dan Inform.*, vol. 10, no. 3, pp. 94–102, 2020.
- [8] A. I. Reyes, "Implementation of an Asset Management and Maintenance System for the College of Information and Communications Technology," *Int. J. Innov. Appl. Stud.*, vol. 12, no. 2, pp. 418–423, 2015.
- [9] I. P. A. Pratama and I. G. T. Suryawan, "Rancang Bangun Sistem Monitoring Pelaksanaan dan Hasil Audit Mutu Internal." *Jurnal S@CIES Volume 7, Nomor 2*, pp. 74–81, 2017.
- [10] S. Yaakub and J. Devitra, "Analisis Pemodelan Sistem Informasi Manajemen Aset Berbasis Web Pada Politeknik Jambi," *J. Manaj. Sist. Inf.*, vol. 2, no. 3, pp. 610–628, 2017.
- [11] N. Husna and L. Fitria, "Sistem Informasi Persediaan Alat Tulis Kantor di Bpjs Kesehatan Cabang Langsa," *J. _COM (Jurnal Informatika dan Teknol. Komput.*, vol. 01, no. 01, pp. 32–40, 2020.
- [12] T. A. Cinderatama, A. F. Dianta, F. S. Efendi, and K. Eliyen, "Web and android-based application for monitoring tuberculosis (TB) patients in Kediri City," *Matrix J. Manaj. Teknol. dan Inform.*, vol. 11, no. 1, pp. 1–10, 2021.
- [13] H. Zenita and R. Fiati, "SDLC Model for Implementation of E-Blangko on Department of Population and Civil Registration," *Klik - Kumpul. J. Ilmu Komput.*, vol. 6, no. 1, p. 58, 2019.
- [14] M. D. Irawan and S. A. Simargolang, "Implementasi E-Arsip Pada Program Studi Teknik Informatika," *J. Teknol. Inf.*, vol. 2, no. 1, p. 67, 2018.
- [15] B. Raharjo, *Belajar Otodidak Framework Codeigniter*, vol. 5, no. 1. Bandung: Informatika Bandung, 2015.
- [16] J. Dermawan and S. Hartini, "Implementasi Model Waterfall Pada Pengembangan Sistem Informasi Perhitungan Nilai Mata Pelajaran Berbasis Web Pada Sekolah Dasar Al-Azhar Syifa Budi Jatibening," *Paradigma*, vol. 19, no. 2, pp. 142–147, 2017.
- [17] M. Hani'ah, Y. Kurniawan, and I. F. Rozi, "livE (onLine – java Exercise) java programming language learning system for lab and online test," *Matrix J. Manaj. Teknol. dan Inform.*, vol. 11, no. 1, pp. 1–10, 2021.

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