Application of RUP (Rational Unified Process) Method in Optimizing Payment Systems and Processing Student Savings Data

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Abstract

Humans continue to innovate in the field of technology, from these innovations it is expected to meet the needs of human life. In educational institutions the role of administration is very important to improve the education system for the better. One of them is in the educational institution of SMKN 5 Tangerang Regency, where the student administration payment system is not optimal. Because the system has not been integrated in the institution. Where the operator will enter and store data in different files, according to the student administration payments made, as well as in making reports. Guardians of students find it difficult to monitor and know when payments are due and the results of student administration payments. So that it has not been able to simplify and accelerate student services related to the information needed by guardians, and the performance of operators. The researcher uses the RUP (Rational Unified Process) development method and to analyze the problem the researcher uses PIECES (Performance, Information, Efficiency, Control, Economy, Service). The system is made using HTML, CSS, Java script, PHP and MySQL languages as the database. The system modeling uses UML (Unified Modeling Language). The results obtained from the research is a payment system and student savings data processing. So that it can help in student services, make it easier to get information for guardians and also the performance of operators in making payments and processing student savings data, as well as in recapitulation and report generation.

Keywords *— Payment System, Savings Data Processing, Students, RUP (Rational Unified Process) Method*

1. INTRODUCTION

Humans continue to innovate in the field of technology, from these innovations it is expected to meet the needs of human life. With the development of technology, information can be accessed more easily and quickly by humans. By utilizing information technology in schools, it can facilitate teaching and learning activities, services, and whatever is concerned at school.

SMK 5 Kabupaten Tangerang has 10 competency skills, including Computer and Network Engineering (TKJ), Software Engineering (RPL), Automotive Light Vehicle Engineering (TKRO), and so on. There are 2798 students in the 2022/2023 school year. Administrative staff are in trouble because of the large number of students if they want to

make school administrative payments such as paying for a list of uniforms, tours and others. Students also queue if they want to pay for school administration. Because the administrative system is not optimal. Plus, if students want to save and take their savings from administrative staff, previously students save at each homeroom and take savings after grade promotion. The current administration process already uses Microsoft Office. Where in an educational institution, student administration is very important to support facilities and infrastructure. For this reason, for the sake of optimization in administrative payments and student data processing, an information system is needed that can help and facilitate students and administrative staff.

The RUP method is used in optimizing the payment system and processing student savings data to anticipate the definition of system requirements that are not too detailed at an early stage. By using the RUP method, this can be overcome by testing carried out by users at the end of each RUP stage to determine system requirements and the suitability of the system development process at each stage. The purpose of involving users in every process in RUP is to produce a system that meets user expectations.

Based on research that has been done previously, among others, discussing the Website-based Public Speaking Application using the RUP method. Testing is done using black box testing and compatibility testing. The results of this study are the results of the evaluation of the system from the participants obtained an average value of the percentage of eligibility, namely 80.2% which is included in the good category and from the supervisor's side the average value of the percentage of eligibility is 83.5% which is included in the very good category. The conclusion of this study, by applying the Rational Unified Process in building an application system, Public Speaking helps users understand the process of building an application, because this method also uses the UML concept which describes the design clearly.[1]

Application of the Rational Unified Process (RUP) Method in the Development of a Medical Check Up Information System at the Citra Medical Center. The Medical Check Up Information System which will be built at the Citra Medical Center was developed with a UML (Unified Model Language) model design, system development using RUP (Rational Unified Process) to anticipate the definition of system requirements that are not too detailed at an early stage, built based on a website with PHP and MySQL programming languages.[2]

A payment system is a set of rules, institutions, and processes for remittances to meet financial obligations. Over time, payment methods are constantly changing. For example, cash payments are replaced by checks and invoices.[3] The payment system can be interpreted as an inter-entity interaction consisting of a set of instruments, procedures, and IFT systems which are components to facilitate the circulation of funds.[4] A website that describes an inventory information system using the Rational Unified Process (RUP) method. RUP is a software development method combined by the rational software corporation using UML (Unified modeling language) in software development. RUP consists of four phases of system development, namely the inception phase, the elaboration phase, the construction phase and the transition phase.[5] In a previous study, entitled Application of the RUP Method to the Information System of the STMIK PalComTech Student Activity Unit, concluded that the

website is used to facilitate gathering information. attendance, member data, activity data, materials and announcements.[6]

In accordance with what has been described above, the researcher took the initiative to build a Payment System and Student Savings Data Processing which serves to accommodate student data, payments, savings or savings and so on that are needed by all related parties using the RUP method, because RUP is suitable in the development of information systems because it has stages such as inception (beginning), elaboration (expansion or planning, construction (construction), transition (transition).

2. RESEARCH METHOD

In making the payment system and processing student deposit data, the researcher used the Rational Unified Process (RUP) method, as explained in previous research by Hilmi et al, that RUP is a software approach that is carried out repeatedly or is iterative if errors occur, focus on architecture (architecture-centric), are more directed based on use cases (use case driven), and has activities that focus on model development using the Unified Model Language (UML), with stages such as inception (beginning), elaboration (expansion or planning), construction (construction), transition (transition).[7] RUP provides a well-defined structure for the software project lifeflow. The RUP method has 4 (four) stages, namely:[8]

1. Inception (Beginning)

This phase is used to review, improve and model business processes and describe what the system should do.

2. Elaboration (Expansion/Planning)

This stage focuses on analysis, system design and implementation. Whether by planning the system design, the device or system architecture can support it or not.

3. Construction (Construction)

In this stage there is testing or system testing that focuses on the implementation of the software in the program code.

4. Transition (Transition)

This stage implements from making what has been modeled into a finished product in the form of an information system design. And at this stage, there is user training, and system maintenance and testing. The iterative process of RUP can be seen in Figure 1.

In this study the researchers also used black box testing, which focuses on the functional specifications of the software. Software testing in terms of functional specifications without testing the design and program code to find out whether the functions, inputs and

outputs of the software are in accordance with the required specifications. Black box testing is one of the software testing methods that focuses on the functional side, especially the input and output of information systems, this submission method is carried out in such a way that there is no need to know the internal code structure of the information system.[9]
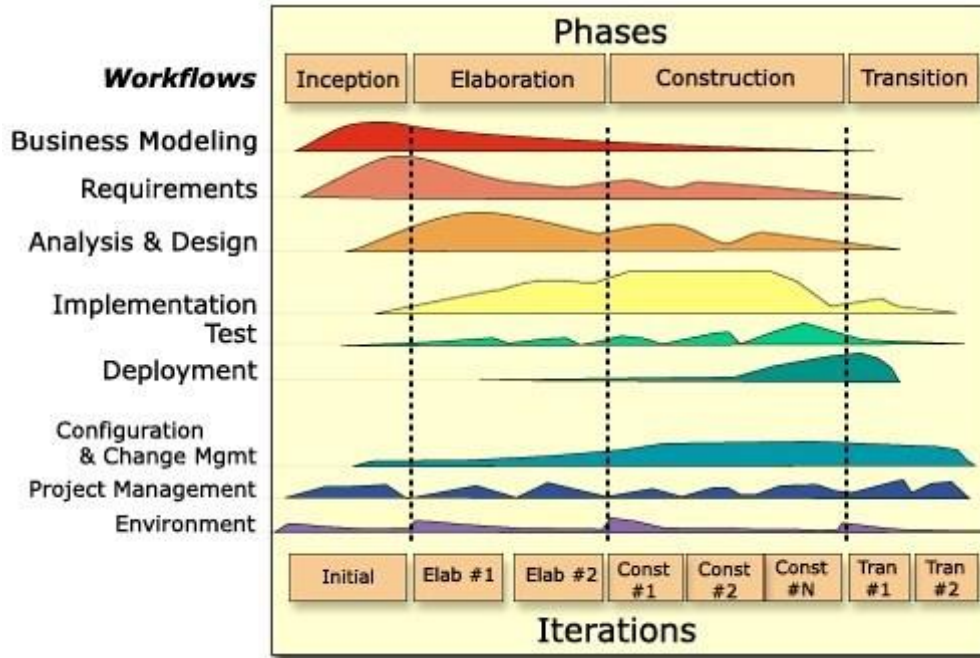

Figure 1. The iterative process of RUP

And with this method it can be seen if the functionality can still accept unexpected data input, causing the stored data to be less valid. Practical solutions to improve accuracy need to be done immediately to fix error gaps that have been found, then intensive security testing is carried out through the internal network (white box penetration testing) on a regular basis by the System Administrator or Information System Manager, especially for those who manage the software and To achieve a level of accuracy, where all accuracy parameters related to aspects of confidentiality, data integrity, and data availability can be met, other methods must be considered, namely Black Box Testing which can be used as a benchmark for information security standards.[10]

3. RESEARCH RESULTS AND DISCUSSION

Various system developments are carried out using various models, one of which is using UML. UML is one of the most reliable tools in the field of object-oriented system development because UML provides a visual modeling language that allows system developers to create a blueprint for their vision in a standardized form. UML serves as a bridge in communicating several aspects of the system through a number of graphic elements that can be combined into diagrams.[11]

1. Inception

Phase In this phase, the requirements for the system are developed. In this study using use case modeling. The use case images are as follows:
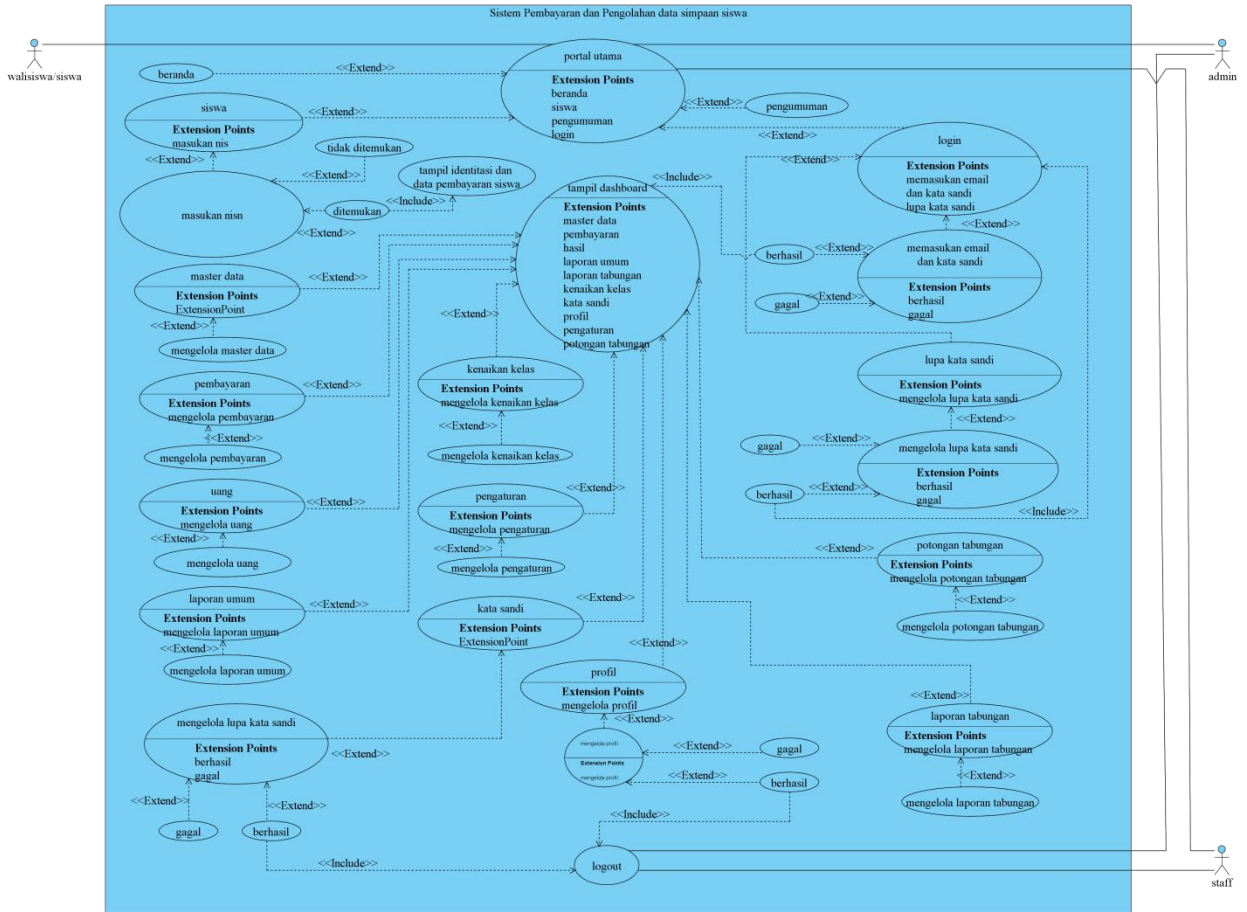
Figure 2. Use Case Diagram

2. Elaboration Phase

At this stage, it focuses on planning the system architecture by proposing new design procedures that will begin to be applied at several stages of data processing by utilizing applications specifically designed to meet the needs of related parties in managing the company. Where in this study using activity diagrams.
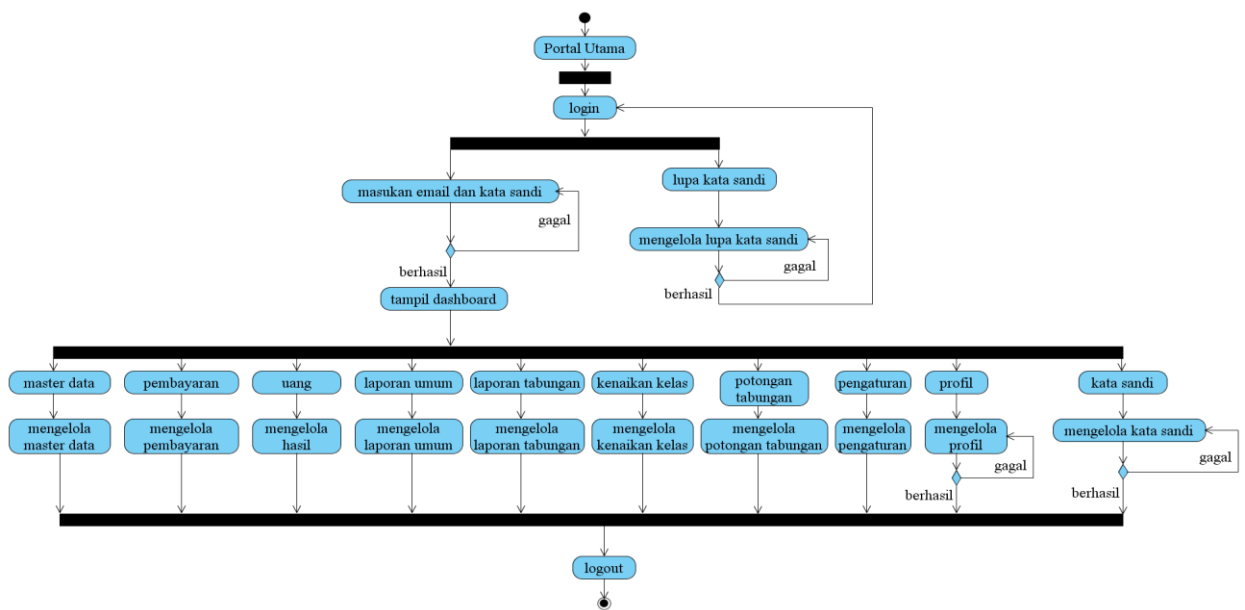
Figure 3. Activity Diagram

3.   Constructions Phase

System specifications are standard requirements to find out the existing and used systems, as a basis for hardware and software engineering so that they become a description of the function and performance of a system to be built or developed.

a.   Main

Page This page is a general homepage, meaning that users can see what information is on the website. On this page there are several menus, including the home menu, announcements, student search, and login. Each of these menus has a different link, and has a different function.
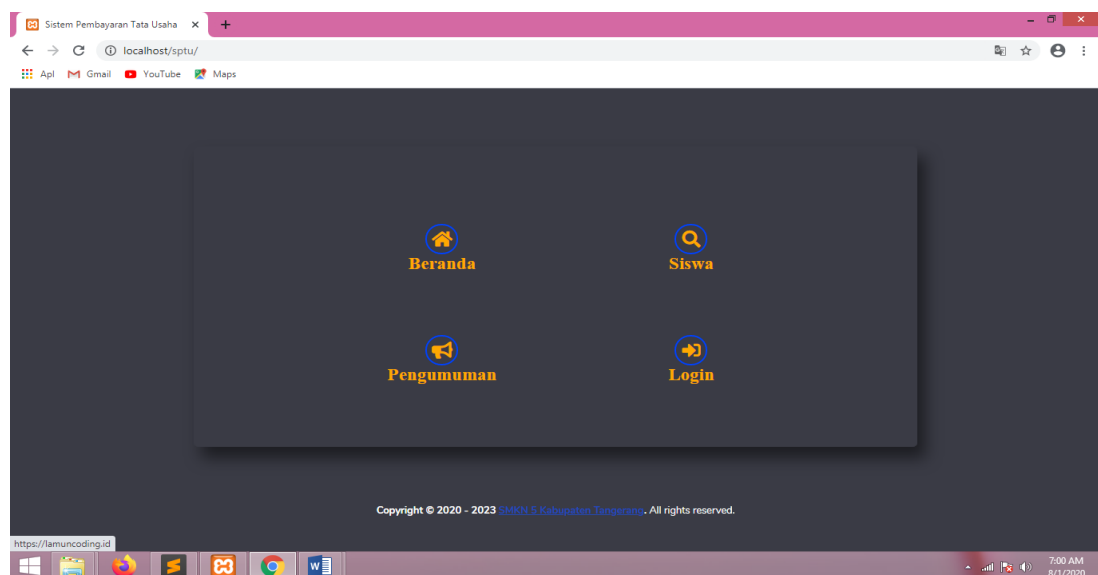
Figure 4. Main Page

b. Login

Page The login page is a page to enter a user into the student payment and savings system page. The login page display can be seen in the following image.
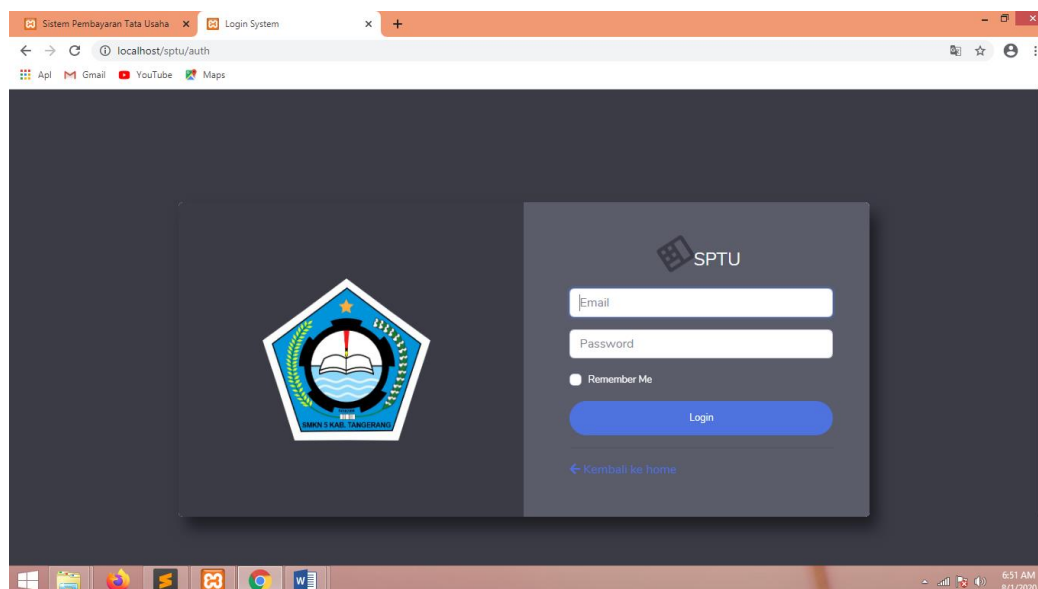
Figure 5. Login Page

c. Dashboard

Page Display of this page occurs, when the user has logged in. On this page there are several menus, including the monthly income and expenditure data menu, student data containing the number of students, majors data containing the number of majors. A graph containing monthly income and expenditure data. Admin loading profile, password and logout.
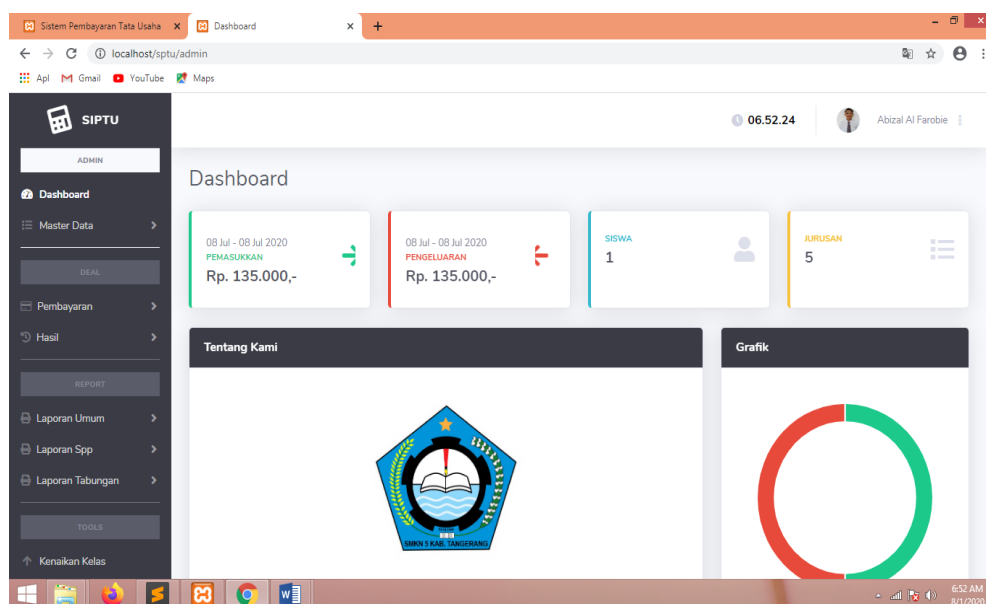
Figure 6. Dashboard Page

d. Payment

Page This page is used to make payments, deposits (savings) and others by entering the student's NISN which makes it easier for officers to input payments.
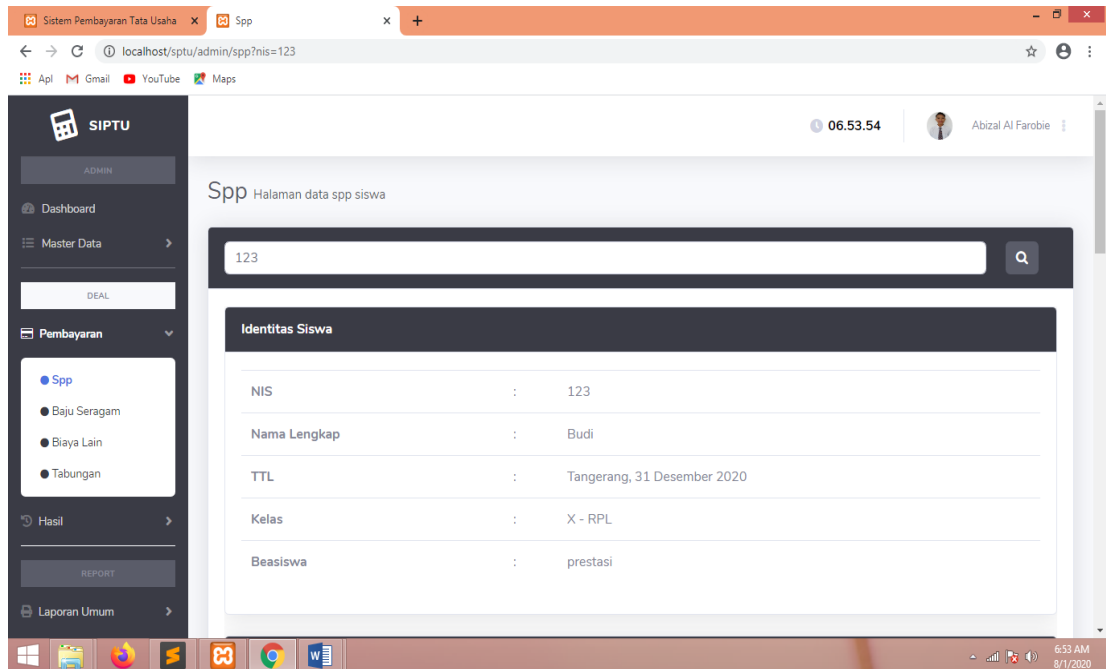
Figure 7. Payment Page

e. Money Menu

Page This page describes the details of the data entry and expenditure data carried out.
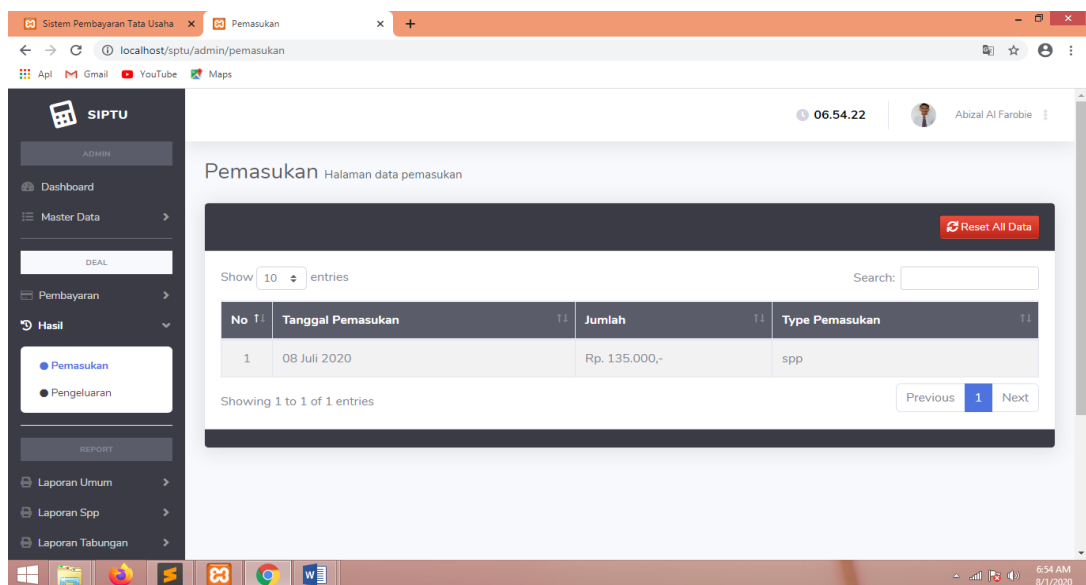
Figure 8. Money Menu Page

f.   General Report
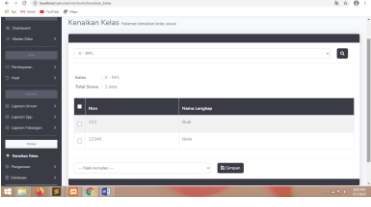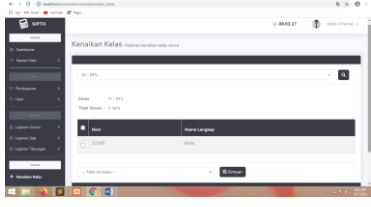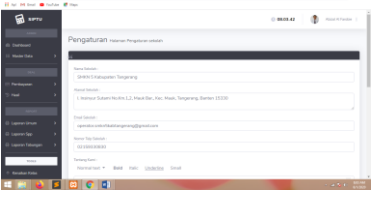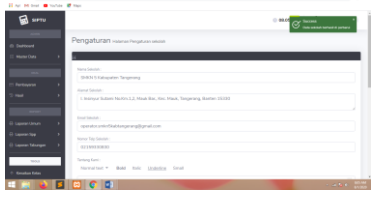
Page This page displays income reports, expense reports, uniform reports, and other expense reports.
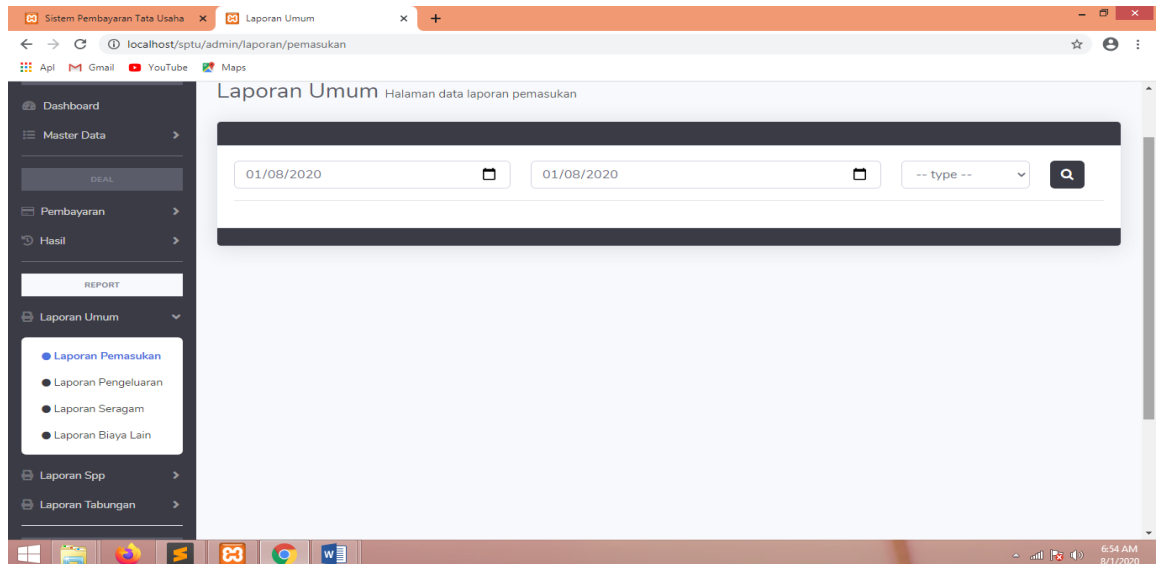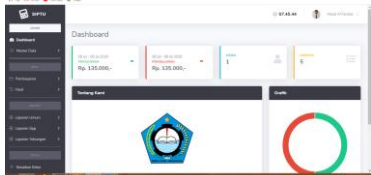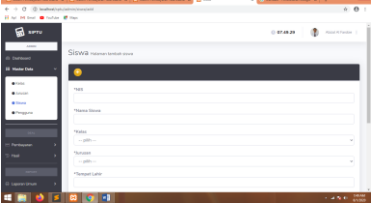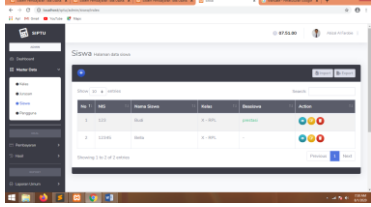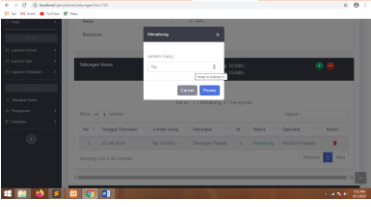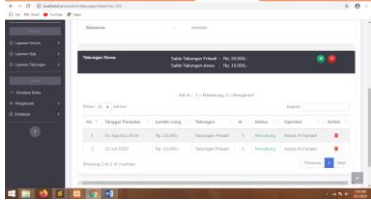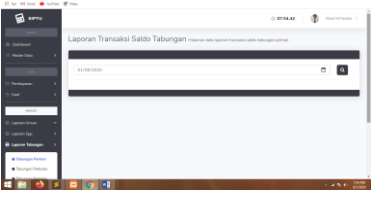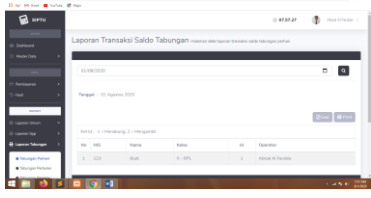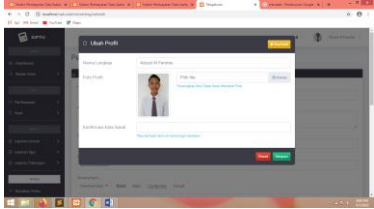

Figure 9. General Report Page
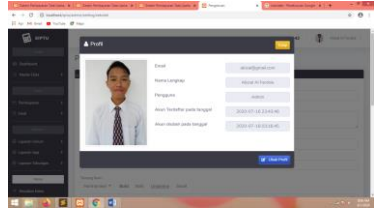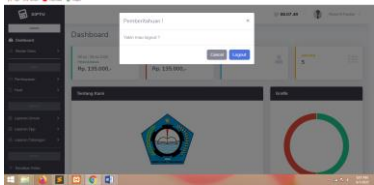
4.   Transition

Phase This stage is the final part of the RUP process. The black box method is used to carry out the process of testing this transition phase system.

Table 1. Black box Testing table

No.	Scheme of Testing	Expected Results	Remarks
1	Looking for student identity and payment data using nis.. *Test Case:*	The system will process and then display the student's identity and payment data. *Test Case:*	Valid
2	Login by entering your email and password. *Test Case:*	The system will process and display the dashboard page. *Test Case:*	Valid

No.	Scheme of Testing	Expected Results	Remarks
3	Manage master data. *Test Case:*	Master data managed successfully. *Test Case:*	Valid
4	Manage payments. *Test Case:*	Payment managed successfully. *Test Case:*	Valid
5	Manage reports according to needs. *Test Case:*	Report successfully displayed. *Test Case:*	Valid
6	Manage the upgrade menu. *Test Case:*	Menu successfully managed. *Test Case:*	Valid
7	Manage settings menu. *Test Case:*	Settings menu managed successfully. *Test Case:*	Valid

No.	Scheme of Testing	Expected Results	Remarks
8	Manage profiles. *Test Case:*	Profile managed successfully. *Test Case:*	Valid
9	Logout. *Test Case:*	Logout was successful. *Test Case:*	Valid

4.   CONCLUSION

Based on the results of the analysis of researchers who have described the Optimization of Payment Systems and Student Savings Data Processing, conclusions can be drawn, among others: By making this payment system it can help increase time efficiency in providing information about payments and so on, as well as increase time efficiency in handling student payments and savings processes, and can be accessed by students and their guardians easily and quickly without having to come directly to the school to find out the status of payments. Data is also safer than recording with a manual system on paper which can be lost at any time. This system can assist in processing student payment data, from payment processing to reporting.

5.   SUGGESTED

The following are some suggestions to improve the payment system and better student deposit data processing, namely: it is hoped that further development can be carried out for a better system and can minimize the possibility of things that are not desirable and can also harm users, as well as perform system maintenance regularly. periodically so that the system that has been created can continue to be used and run properly. Then there is a need for training for related parties so that they can use the system that has been made properly.

6.   REFERENCES

[1]   Hakimin, K., Jaroji, J., & Asep Subandri, M. (2021). Penerapan Metode Rational Unified Process (Rup) Pada Pembuatan Aplikasi Public Speaking. Seminar Nasional Industri Dan Teknologi, 250–259.

[2]   Perwitasari, R., Afawani, R., & Anjarwani, S. E. (2020). Penerapan Metode Rational Unified Process (RUP) Dalam Pengembangan Sistem Informasi Medical Check Up Pada Citra Medical Centre. Jurnal Teknologi Informasi, Komputer, Dan Aplikasinya (JTIKA), 2(1), 76–88.

[3]   Andriani, A. D., Yuniawati, R. I., Pandriadi, Hamidin, D., Priambodo, A., Suhardi, Sulaeman, M., Susanti, L., Darmawan, A., & Martono, S. (2022). *Transformasi Indonesia Menuju Cashless Society*. TOHAR MEDIA.

[4]   Harahap, A. R. N., Idayanti, S., & Rahayu, K. (2022). Perlindungan Hukum terhadap Sistem Pembayaran Transaksi Elektronik Lintas Batas Negara. Penerbit NEM.

[5]   Hikmah, N., Lesmana, R. S., Leliyanah, L., & Utami, D. Y. (2021). Perancangan Sistem Informasi Persediaan Barang menggunakan metode RUP (Studi Kasus PT Medical Device Indonesia). Computer Science (CO-SCIENCE), 1(1), 72–80.

[6]   Widyanto, A. (2020). Penerapan Metode RUP pada Sistem Informasi Unit Kegiatan Mahasiswa STMIK PalComTech. Jurnal Sisfokom (Sistem Informasi Dan Komputer), 9(3), 323–331.

[7]   Hilmi, I., Armiati, S., & Mubassiran. (2020). SISTEM INFORMASI SURAT MASUK MENGGUNAKAN METODE RUP (RATIONAL UNIFIED PROCESS) (STUDI KASUS: LEMBAGA BADAN NARKOTIKA NASIONAL PROVINSI JAWA BARAT. Improve, 12(2), 75–79.

[8]   Yanah, L., Hardani, S., Suharyanto, S., & Muthia, E. (2022). Perancangan Sistem Informasi Rekrutmen Karyawan Dengan Metode RUP. JISAMAR (Journal of Information System, Applied, Management, Accounting and Research), 6(1), 32–46.

[9]   Purba, R. A., Simarmata, J., Aum, W. O. R., Darsin, D., Jamaludin, J., Ichwani, A., Arni, S., Praseptiawan, M., Nur, M. N. A., & Muslihi, M. T. (2022). Pengembangan Sistem Informasi: Analisis, Pemodelan, dan Perangkat Lunak. Yayasan Kita Menulis.

[10] G. W. Sasmito, "Penerapan Metode Waterfall Pada Desain Sistem Informasi Geografis Industri Kabupaten Tegal," J. Inform. Pengemb. IT, vol. 2, no. 1, pp. 6–12, 2017.

[11] Henderi, H., & Supriati, R. (2020). Perancangan Sistem Informasi: Pendekatan Terstruktur dan Visual. Serang : Yayasan Pendidikan dan Sosial Indonesia Maju (YPSIM) Banten.