Journal of Computer Networks, Architecture and High Performance Computing
Volume 5, Number 2, July 2023
https://doi.org/10.47709/cnahpc.v5i2.2724

Submitted : Aug 15, 2023
Accepted : Aug 15, 2023
Published : Aug 16, 2023

Web-based Application for Savings and Payment Management using CodeIgniter case study Elementary School

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ABSTRACT
Schools often face problems in manually recording student contributions and savings: ineffectiveness, inefficiency, and inaccuracies in recording, calculating, or the three data are needed again. In this study, we offer Savings Management Information Systems (SiMantab), which aim to solve these problems. In order to realize the research objectives, we proposed to apply CodeIgniter to develop SiMantab for recording student data, student guardians, information on savings, reports on student transactions, and payments. The outcomes of this research are: 1) SiMantab can generate daily savings reports for each student and provide reports for student guardians'; 2) SiMantab allows student guardians to monitor payment activities such as tuition fees in auto debit savings; 3) SiMantab is able to convey information bills statement on the student guardian's menu; and 4) The school obtain information on students' payments record based on the student data such as gender and class displayed on the supervisor's main menu.

Keywords: CodeIgniter, tuition fees, savings, SiMantab.

INTRODUCTION

Integrated Islamic Elementary School (SDIT) Nurul Ilmi, under the auspices of the Robbani Integrated Islamic Education Foundation (YPIT) located in Rejoagung Village, Ploso District, Jombang Regency, East Java Province, Indonesia is an educational institution that has been registered with the Ministry of Education, Culture, Research and Technology of the Republic of Indonesia (Kemdikbud RI) is accredited C. Some activities carried out by the Administrative Officer (TU) at SDIT Nurul Ilmi are paying school fees and student savings. The withdrawal system for student savings as they need. Currently, financial records using Microsoft Excel and re-recorded in the paper based on the savings are ineffective. The calculation still uses a calculator, which is prone to inaccuracies. When a student's guardian wants to know the amount of savings, it also takes time because they have to check it manually. Therefore, a web-based information system is required to manage financial data related to tuition payments and student savings, making it easier for TU officers and providing better service to student guardians. In the current system, students or student guardians must deposit money in cash to the finance department by attaching of invoice previously to the student guardian. When the student's guardian cannot attend, the student's guardian can entrust it to the student. The potential risk is that the money the students keep for tuition fee payments is not paid.

Research related to student school payments has been carried out, including 1) Katrin (2012) proposed an application for payment of committee fees and student savings equipped with information based on Short Message Service (SMS) at SMA Negeri 1 Kalasan, Sleman, Yogyakarta. The application was developed using the PHP programming language with the CodeIgniter framework, Database Management System (DBMS) using MySQL, and SMS using Gammu; 2) Nisa et al. (2017) proposed an application for payment of Education Development Contributions (SPP) and student savings at the Madrasah Tsanawiyah (MTs) and Madrasah Aliyah (MA) levels. The application is developed using the waterfall model. The programming language uses PHP with the CodeIgniter framework, DBMS uses MySQL, SMS Gateway uses SMS Gateway Me; 3) Handayani (2011) proposed an information system application for payment of tuition and fees for Piri 2 high school in Yogyakarta using the Visual Basic programming language and the Microsoft Access DBMS.

In Katrin's (2012) proposal, application access is only given to financial officers, and payment notifications are made via SMS notifications to student guardians. This still has drawbacks because the student's guardian needs to learn the details of the arrears that have been made, as well as reports of previous transactions. Student guardians also do not have direct access rights to the application to find out the details of reports or make transactions such as saving deposits or paying obligations. In the research proposal of Nisa et al. (2017), notifications are given to the student's

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guardian via SMS. Guardians of students can use the application to transfer savings, but it cannot be used to pay tuition fees through savings that have been previously paid. Meanwhile, in Handayani's (2011) research proposal, the application is still desktop-based, and the distribution of the application is only within the scope of the school's finance department. So that the student's guardian still has to contact the finance department to obtain payment information and arrears that must be paid.

This research proposes a student savings management application that allows student guardians to make payments through savings owned by students and to know savings activities and school payment obligations. The payment process is an obligation through savings that can be done independently by the student's guardian in real-time (online).

LITERATURE REVIEW

The previous studies related to student payments, as follows (Table 1).

Table 1. State of the art

No.	Researchers	Problem	Proposed	Outcome
1.	Rinaldi et al. (2023)	Savings transaction data for vocational high school (SMK) students in Jakarta uses a conventional system.	Web-based student savings application with development using a waterfall with the PHP programming language.	The student savings application was successfully created and the results of the application can make it easier to enter both student data and transaction reports.
2.	Wahyuningsih et al. (2023)	Transaction data for payment of tuition fees and savings for elementary school students in Jakarta uses a conventional system.	Web-based tuition and student savings payment system with development using prototyping with the PHP programming language, testing using alpha (black box) and beta (validation from system users consisting of TU staff and school principals)	The proposed system works well and has features such as school year settings, class data management, student data management, homeroom data management, payment type management, making arrears reports, managing payment transactions, printing tuition cards, and billing payments. The proposed system can make it easier for TU staff to manage administration data for tuition payments and student savings. All data can be integrated so that it is very effective and efficient. The system can be accessed in an external environment, namely the student's guardian can find out information on tuition payments and or the savings balance of the student concerned.
3.	Hari et al. (2023)	Financial transactions at the Regional Public Service Agency (BLUD) mini-bank for SMK Negeri level schools in Surabaya still use the conventional	Optimizing efficiency in mini bank BLUD transactions by developing a system using the System Development Life Cycle (SDLC).	The proposed system helps to easily and quickly collect transaction data at mini banks in accessing data and processing information. The system can also be used as a standard work basis so that any students who serve in this mini bank are able to provide the

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No.	Researchers	Problem	Proposed	Outcome
		system		same service and have good data access.
4.	Amalia et al. (2023)	The payment system for junior high school (SMP) level tuition fees in Bengkalis, Riau still uses the conventional system.	Developing an information system for recording and notifying tuition fees using the SDLC method and the Java programming language.	The proposed information system can input class data, students, users, tuition fees, and payments. The proposed method facilitates the recording and notification of payment data. The proposed system has a notification feature via SMS so that students who have not paid their tuition fees can immediately follow up.
5.	Margaretha and Pakereng (2022)	There is no systematic bank book recording process at PT. Asuransi Sinarmas especially in the financial division.	The design of a bank book information system uses the Oracle Java Application Development Framework with the Oracle MySQL database, testing using a black box and compatibility.	The proposed system can help and facilitate users in carrying out the recording process and filtering bank book searches.
6.	Abdu et al. (2022)	The administrative process for paying students at the SMK level in Surakarta still uses the conventional system.	Propose a student payment administration information system to view payment history and bills. The proposed method is website-based, using Visual Studio Code, MySQL DBMS, and PHP programming language. The proposed approach was developed using Rapid Application Development (RAD). System testing uses a black box, and user testing uses a questionnaire.	Based on the results of user testing involving admins, treasurers, and school principals, it has the highest score with the 'agree' option of 60%. As for students, the highest score is the 'agree' option of 55%.
7.	Silfiyanti et al. (2020)	Management of student savings data at the Islamic elementary school (MI) level in Gresik still uses a conventional system.	Propose a web-based student passbook recording information system using a waterfall and black box testing.	The proposed system can increase the effectiveness and efficiency by 90% in searching, creating, and storing student savings data.
8.	Ashari (2014)	Payment for high school level students in Pacitan still uses the conventional system.	Propose a payment information system using Java and MySQL.	The proposed system has data input, search, and student payment reports facilities.
9.	Hapsari and Wardati (2011)	The payment and savings information system for Pringkuku	Proposing a payment information system using the PHP programming language and MySQL database.	The proposed system can optimize existing computer systems in the process of paying school fees, student

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No.	Researchers	Problem	Proposed	Outcome
		Vocational High School students, Pacitan, is still conventional.		savings and reporting. So that data can be managed properly and produce easy and accurate information.
10.	Wijaya & Harjuna (2017)	The MI level savings system in Bengkulu is still manual.	Propose a savings system using the Nginx server and beta-testing users, such as savings officers and teachers.	Based on the test results, the average value of the success rate and satisfaction with using the proposed system is 80%.
11.	Tasiba & Herlawati (2018)	Payment for junior high school education fees in Tambun Selatan, Bekasi, is still conventional.	Propose an information system regarding payment of tuition fees using Visual Basic.Net, a system development method using a waterfall, accompanied by SWOT analysis and TELOS feasibility analysis.	After conducting research at SMP PGRI Tambun Selatan regarding the information system for paying student education fees, an application was produced, a form of improving the information system, which has been done manually to become computer-based. This information system was created based on a request from the school according to the currently running system process. After the research, it can be concluded: a). With the design of a student education fee payment system in this application, schools can easily and quickly process tuition payment calculations and reduce the error rate in data processing. b). The proposed approach can speed up finding student payment data, making student tuition payment receipts, and making reports that are presented quickly and accurately.

METHOD

A. Current System Analysis

Fig. 1 is shown the student savings deposit process starts with cash deposits made by students or student guardians to Administrative officers (TU) or the finance department at school. The cash deposit is then recorded by a TU employee or the finance section in the student's savings book, which will later become the student's or student's guardian. TU employees also record savings deposits that go into their financial records.

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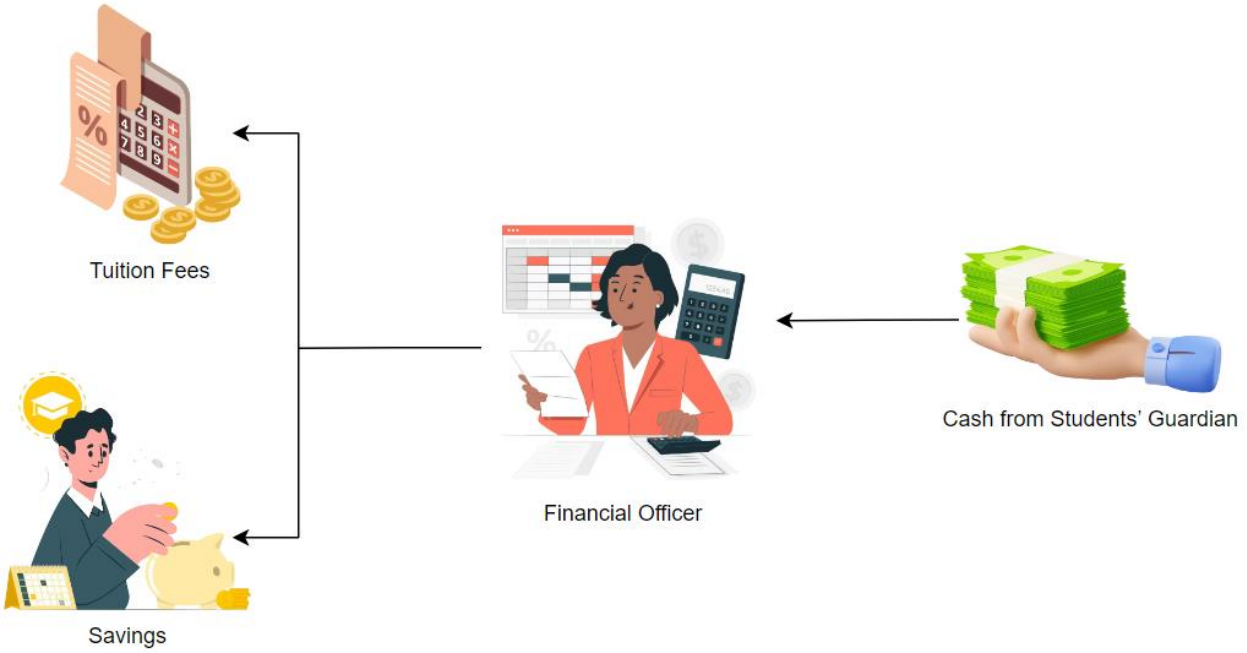


Fig. 1 Current System

Before making school obligation payments, the finance department will provide a printout of payment obligations on a piece of paper which is then given to the student's guardian to be paid later. The process of paying student school fees is carried out by students or student guardians directly in cash to the TU section based on the printout previously provided. Administration staff or the finance department then records school payments to the student's contribution card and financial records.

With the current payment method, several potentials could harm the school or student guardians, including the loss of the school's financial records or even the cost and savings cards owned by the school. If the student's guardian wants to make school payments, they must also provide cash in advance. This has drawbacks because amounts deposited through students may not be conveyed due to the students' negligence. For example, money is lost or forgotten. Contribution payments can be made by taking from school savings that have been previously owned. However, this is impractical because TU officers have to manually record finances two times, namely withdrawing cash from savings and paying school fees in cash.

B. Proposed System

To avoid recording errors and help speed up the efficient payment process, this research proposes the Savings Management Information System (SiMantab) application for recording savings and financial payments. SiMantab can be used to record all student payments and savings deposits. Payments can be made personally by the student's guardian through SiMantab, and even payment of school obligations can be taken directly from the student's savings.

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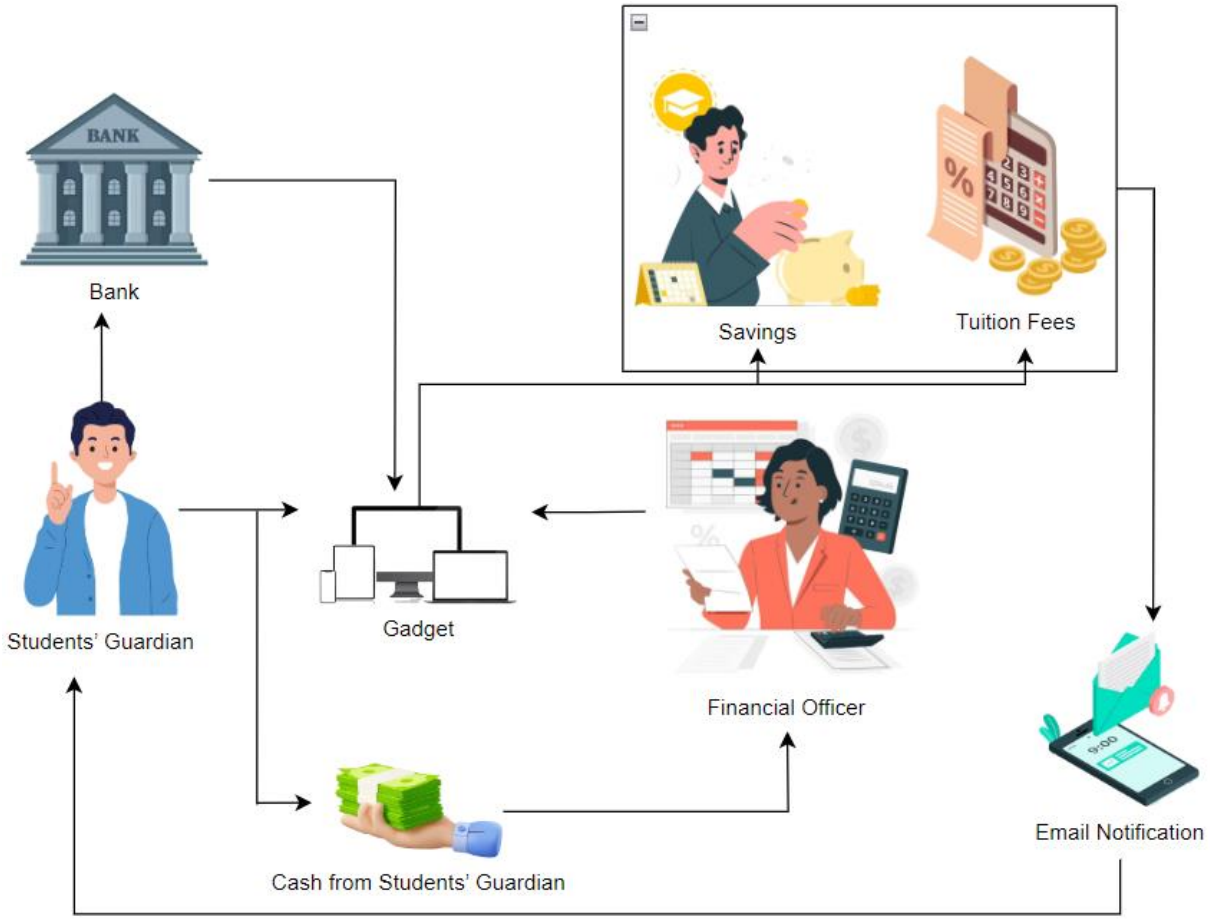


Fig. 2 Proposed System

This application is intended to make it easier for student guardians to monitor student savings and payments because student guardians directly monitor payment activities. On the other hand, SiMantab also allows students to make savings deposits in cash to TU employees or the finance department. This will provide students with early learning to save. An illustration of the proposed system is presented in Fig. 2.

C. Functional

The functional requirements of this CodeIgniter-based student savings management application are:

a) The system can record students' primary data,
b) The system can record the primary data of student guardians,
c) The system can provide information on student savings balances,
d) The system can provide reports on student savings activities,
e) The system can submit payment obligations for each student,
f) The system can record the activity of paying the obligations of each student, and
g) The system can present reports related to saving activities and payment of student obligations.

The system will help process existing data to form student payment bills based on the school year entered, class, and payment post.

D. Non-functional

Non-functional requirements for this system include:

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a) Operational: Using a Windows or Linux operating system (OS), 2GB RAM, Pentium IV Processor, 500GB hard drive, and internet network, you can even use a cellphone or tablet.
b) Minimum system requirements: Desktop users use Internet Explorer browser version 11.0.11, while mobile users use at least Google Chrome version 77.0.3865.116.
c) User interface: This system's user-friendly display makes it easy for users to understand.
d) Security: The security of this system is guaranteed because of the access rights feature for admin, financial officer, and registered username, which is unique.

Performance: Because this system is web-based, it can be used anywhere at any time using a cellphone or computer that has an internet connection as long as the OS and browser version used is the minimum version that has been specified.

E. Design System

The proposed system design is presented as use case, activity, sequence, and class diagrams. Use case diagrams to describe the behavior of actors in the system. In this study, the users consisted of two actors: the student guardians and the financial section of the SiMantab application. Guardians of students can carry out several activities, such as making bill payments by deducting student savings balances or requesting top-up student savings balances. While the finance department can make student bills based on class and school year and verify requests for additional savings to make cash transactions such as paying student bills to deposits and withdrawals of savings.

Activity diagrams are intended for computational modeling of the flow of work in the developed system. These activity diagrams include activity diagrams for creating a SiMantab account for student guardians, login activity diagrams, activity diagrams for saving by transferring a bank account, and activity diagrams for payment of school obligations. For example, the Activity diagram for creating a SiMantab account for student guardians is helpful for users to access this application. Applications can be used to create accounts for student guardians and associate them with student accounts. Creating a SiMantab account is a must to access this application. Funds can only be made through the system administrator because the administrator must validate the student's guardian data from the account created.

This class diagram reflects the data and processes in the SiMantab application. The data generated includes the identity of students per student guardian, the status of payment obligations and arrears, and savings balances for each student. Savings balance data is in numbers with the decimal data type. Then there is data for student identification numbers with varchar type and student name and address attributes with varchar data type. Sequence diagrams usually describe the behavior of objects in use cases by describing the lifetime of things and messages sent and received between objects (Sukamto & Shalahuddin, 2011)

F. Implementation

This system was developed using the CodeIgniter framework so that in preparing the file structure, it must follow the rules that are owned by CodeIgniter. The file structure contained in this system is presented in Table 2.

As shown in Table 1, the CodeIgniter file and folder structure has been defined. For example, the config folder only contains files related to application settings, such as databases, routines, etc. Users can freely make adjustments in this folder. Then, store all files that function as application controls in the controller folder. Whereas models store files that connect applications with the database used, views store files responsible for providing views to users. All files in this folder have a php extension, the programming language used. When the application starts to be accessed by users, it will first check the connection to the database used. If the link to the database is successful, the framework will immediately check routes to be directed to the specified controller address. In this application, if the user does not have a login session, they will be required to the login controller and call the login view and its supporting components, such as libraries or javascript, in the view folder. From this login screen, the user must fill in the username and password to access the next page.

Table 2. Struktur file CodeIgniter

Struktur	Keterangan
…/application/config	Application and database configuration
…/application/controllers	Placement of application control files
…/ application/models	Management of data from applications and databases

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…/ application/views	Management of application page views
…/ application/libraries	Management of library usage from third parties

```php
public function ceklogin(){
    # REQUEST NILAI DARI FORM
    $this->load->model('modTabsis/Mlogin');
    $username = $this->input->post('username');
    $password = md5($this->input->post('password'));
    $query = $this->Mlogin->auth_user( $username, $password );
    if( $query->num_rows() > 0 ){ # ADA
        $row = $query->row();
    $newdata = array(
            'username'  => $row->username,
            'role' => $row->role,
            'nama'  => $row->namalengkap,
            'email' => $row->email,
            'id' => $row->kode,
            'alamat' => $row->alamat,
            'tglLahir' => $row->tglLahir,
            'kodewali' => $this->encrypt->encode($row->kodewali),
            'level' => $row->level,
    );
    # SIMPAN ARRAY KE SESSION
    $this->session->set_userdata($newdata);

    # PINDAH KE HALAMAN BERANDA
    if ($row->role == 'T0') {
        redirect( base_url('/T0/T0'));
    }elseif ($row->role == 'T01') {
        redirect( base_url('/T01/T01'));
    }elseif ($row->role == 'T02') {
        redirect( base_url('/T02/T02'));
    }elseif ($row->role == 'T03') {
        redirect( base_url('/T03/T03'));
    }

    } else { # TIDAK ADA
        # BUAT FLASH NOTIFIKASI
        $this->session->set_flashdata('alert', '<div class="alert alert-danger"><i class="fa
            fa-user-times"></i> Akun tidak dapat ditemukan<br>Silahkan periksa kembali username dan
            password anda</div>');
        # PINDAH KEHALAMAN LOGIN
        redirect( base_url('login') );
    }


}
```

Fig. 3 Login function in *controller*

Fig. 3 illustrates the implementation of Functions in CodeIgniter to check logins in the controller. The function checks the user level based on the username and password entered from the login page. As presented in Fig. 3, the check-login process also calls the Mlogin model, which contains commands to check the username and password entered by the user from the login page. If the username and password match, then the controller will determine which display will be given to the user according to their level. As shown in Fig. 3, if the user level is T0 or admin, the controller will call controller T0 to display the admin page. However, if the username and password do not match, the application will notify that the username and password do not match. The SiMantab application also saves user sessions to be utilized by applications, for example, to retrieve data related to only user logins or setting the duration of each login session. This needs to be done because CodeIgniter always reads the running application usage session for the application's security.

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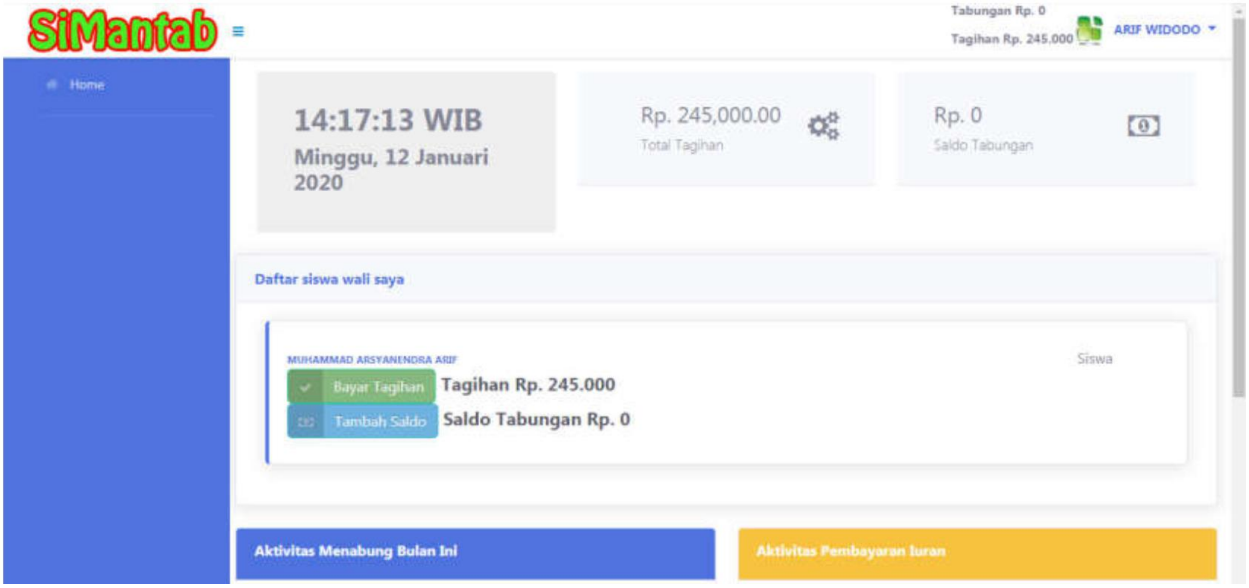


Fig. 4 Main page proposed

Fig. 4 illustrates the start page for student guardian users when successfully logged in. The page displays student information that is the responsibility of the student's guardian. If the student's guardian has only one student, then only one student's name will be displayed, whereas if there is more than one student, more than one student's name will also be displayed on this page. This page also shows facilities for adding savings balances, payment of student obligations through savings, information on the total savings balance owned by each student, and the total bill that is the responsibility of each student.

G. Testing

Application testing is carried out using the black box method, namely use case testing. Testing ensures that each use case (feature) can run as it should. The number of test cases is at least one for each use case. Some of the tests carried out are login testing, testing of payment type settings, testing of making student invoices, testing of linking student guardian data, testing of savings transactions, testing of bill payment transactions, and testing of savings top-ups.

RESULT

Based on the testing results using a black box, the proposed application is as expected. These tests include the login use case test, with the first test scenario being carried out by entering the correct username and password according to what is in the database (Fig. 5). As a result, the application displays the account owner having successfully accessed the account, and the user's main page is displayed. This page is used for all levels of users so that both student guardian users, the financial section, to the system admin only need to use this page to enter the application. Fig. 6 shows that the second test scenario that the login process was unsuccessful because the username and password data were not found in the database, so the login use case was according to design.

Testing the payment type setting uses two test scenarios: entering the payment nominal and changing the deletion of the nominal obligation per payment item. The test for making student invoices uses two test scenarios in the form of no student payment data yet, and there is already a history of student bill payments. The test for linking student guardian data uses two test scenarios: adjusting student guardian data to students and displaying student data according to the linked student guardian. The savings transaction test uses three trial scenarios: making cash deposits for savings, making cash withdrawals when the savings balance is insufficient, and making cash withdrawals when the savings balance is adequate. Testing bill payment transactions uses four test scenarios in the form of paying bills in cash through the finance department, displaying billing data for which there are still arrears in payment, making bill payments with a savings balance greater than the nominal bill, and making bill payments with a savings balance less

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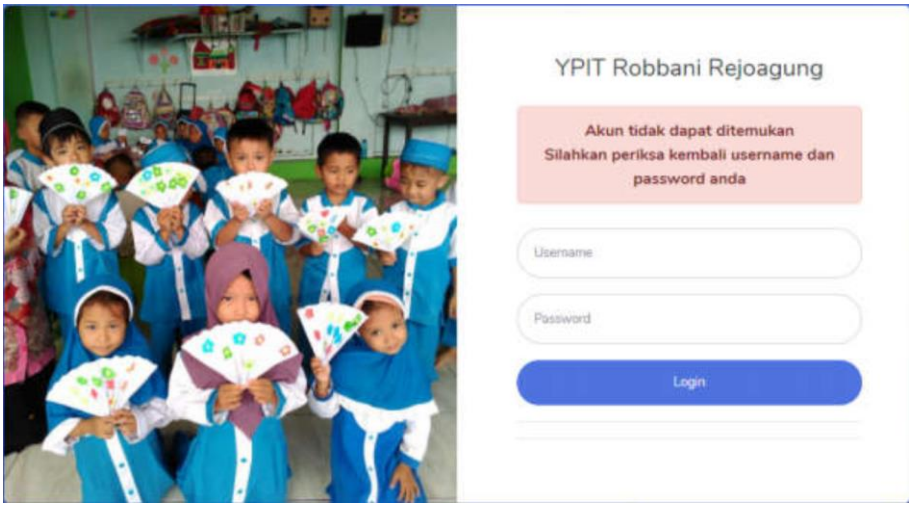
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than the minor bill. The savings top-up test uses two test scenarios in the form of an accepted savings balance top-up process and a rejected savings balance top-up process. As a result, all test scenarios were successful, as expected.



Fig. 5 Login page



DISCUSSIONS

In addition to testing using black boxes, in this study, database validation was also carried out to determine whether the data entered, processed, and output in the form of transactions were following the database design at the method stage. For example, the student table has fields according to the design that has been made. For example, the student's full name will be recorded in the full name field. Except for code and date of birth, all fields in the student table have the data type varchar with various character limits. Students in all classes are recorded in this table, complete with their attributes. However, specifically student photos, they are not stored in the student table. Student photos will be held in the assets folder in the SiMantab application root, while the student table will only keep the file name in the image field. Later from the display, call the name of the file. Each student's data has its student guardian code. That is, a student guardian can have a relationship with more than one student. If a student's guardian has two children who attend SDIT Nurul Ilmi, then when logging in, the student's guardian will have two children who can manage both their savings and payment of dues.

Students, to make payments. First, each student must have a payment bill for each payment type. The bill amount for payment depends on the obligation determined in the fee setup menu for each class and student academic year. Bills that have been made will not be made again for the same student, class, academic year, and payment type. For example, the student bill table stores all student bills. The student billing table will only store nis, payment code, type

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code, month, year, nominal, class code, and school year code. For bills that the student must pay monthly, the month code and year of obligation are required, while for annual payments, only the year of payment is required. Obligation bills paid once during the school year do not need the month and year of the bill.

The savings movement table is a table used to store student savings mutation data. Both savings withdrawals and deposits will be entered into this table. If a savings transaction is a savings withdrawal, the exit column will be filled in according to the nominal transaction. If the savings transaction is a savings deposit, the entry column will be filled in according to the nominal transaction. Each type of transaction is also differentiated based on the facility code, namely D for savings withdrawals and K for savings deposits. This savings movement table also stores data relating to student payment transactions made through student savings. For every bill payment made through savings, the data will be stored as a savings withdrawal with a nominal value according to the bill payment that has been made. Every savings transaction also includes a unique invoice number used as proof of transactions created. The invoice number combines the transaction type code, transaction time, and a unique five-digit number taken when transactions are made through the application. The outstanding invoice number created by the application is then stored in this table as proof of a valid transaction.

The student bill payment table is a table that stores student bill payments, which are made based on previously formed student billing data. Both bill payments made in cash through the finance department and those made through savings by the student's guardian are only distinguished from the method of payment field. While the remaining student payment obligations are calculated from the total obligations that have been formed minus the payment obligations made by students. If the student has no bill payment obligations, the SiMantab application will not display the bill. All student payment activities are saved and will not affect the student billing table. The application from this billing and payment table will calculate the number of student obligations the student must pay.

CONCLUSION

The problem with the system for paying school fees and student savings is that they are still recorded using Microsoft Excel, and handwritten notebooks have several drawbacks, including ineffective and efficient recording and being prone to inaccurate calculations because they still use a calculator. In this study, to overcome these problems, it is proposed to make SiMantab using CodeIgniter. The results of this study found that: 1) SiMantab can generate daily savings reports and daily reports per student, which can provide student guardians control over student saving activities; 2) SiMantab has given student guardians control over obligation payment activities by providing student tuition payment facilities through direct savings; 3) SiMantab can convey information on student obligations by providing a list of nominal bills that can be seen on the student guardian's main page; and 4) The school has obtained information on students' financial activities based on the main student data such as gender and class displayed on the supervisor's main page.

This research still has limitations, therefore in future research, it is recommended to provide notifications in the form of push notifications to each student's guardian if there is an activity in savings and there is a payment obligation that must be paid immediately and apply Secure Socket Layer (SSL) to the domain address used so that application security is guaranteed.

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Journal of Computer Networks, Architecture and High Performance Computing
Volume 5, Number 2, July 2023
https://doi.org/10.47709/cnahpc.v5i2.2724

Submitted : Aug 15, 2023
Accepted : Aug 15, 2023
Published : Aug 16, 2023

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