

# Prototype design of crowdfunding-based student tuition payment E-Wallet management application (startup) at STMIK Bandung Bali

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**Abstract:** This research designed and developed a prototype e-wallet management application for crowdfunding-based tuition fee payment at STMIK Bandung Bali, addressing higher education cost challenges. Using Agile methodology, the development covered requirements analysis, UI/database design, payment gateway integration, and testing. Core functionalities include student data, academic history, billing, e-wallet balance, donor contributions, and campus operator disbursements. Functional testing showed 100% success across all 9 black-box test scenarios, confirming successful crowdfunding system implementation. However, load and stress tests on shared hosting (0.5 CPU, 256 MB RAM) revealed performance limitations. Response times increased sharply from 2.2 seconds (100 requests) to 14.6 seconds (200 requests), with over 95% system failure beyond 400 concurrent requests, indicating hosting resource constraints. Empirical user evaluations (10 students, 5 donors, 2 operators) confirmed high system effectiveness and usability, yielding average scores of 4.2 for effectiveness and 4.0 for usability (on a 5-point Likert scale). Security measures include private key API integration, AES password encryption, and restricted sensitive data access. This research's success lies in its specific technical solution for institutional tuition crowdfunding, integrating directly with STMIK Bandung Bali's financial management, differentiating it from general platforms.

**Keywords:** disbursement system, education donation, payment gateway, student E-Wallet management, tuition crowdfunding

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## Introduction

The level of higher education in Bali reflects the commitment to human resource development in the region. In August 2023, of Bali's 2.62 million working population, 17.51% of them had a higher education (diploma or university) [1]. In this digital era, access to higher education requires efficient and adaptive financial management solutions. The reality on the ground shows that conventional tuition payment systems often face challenges, both in terms of administration and ease of access for users.

The 2018 and 2021 Education Support Statistics data released by the Badan Pusat Statistik (BPS) shows that the cost of higher education in private universities has increased by 4.2% in the last three years, from an average of IDR 16.3 million in 2018 to IDR 17 million in 2021 [2], [3]. This phenomenon, coupled with data on tuition payment arrears of 30.88% at STMIK Bandung Bali in the 2023/2024 academic year [4] and supported by the results of interviews with the Finance Department, shows that STMIK Bandung Bali students are in arrears with tuition payments due to poor billing systems and student financial problems. Underscoring the need for innovation in education payment and fund management systems, this challenge demands the development of a platform that not only facilitates financial transactions but also enables adaptive fund collection mechanisms.

Previous research has explored various technological solutions to the payment problem, including the use of e-wallets [5], [6], [7] and crowdfunding methods [8], [9], [10]. Crowdfunding has proven to be an effective method of raising funds. Common crowdfunding platforms such as GoFundMe or Kitabisa.com, although supporting educational campaigns [11], are designed as broad donation platforms with varied fund disbursement processes but are not directly integrated with the financial systems of educational institutions. The implementation of crowdfunding specifically for student tuition payments in an e-wallet format that is directly integrated with higher education financial management still requires further exploration from a technical prototype design point of view. The gap between the need for a modern payment system and the availability of specific integrated solutions is the basis for the urgency of this research.

This research focuses on designing and developing a prototype e-wallet application specifically designed to facilitate payment of tuition fees through crowdfunding methods for students at STMIK Bandung Bali. The main objective is to present a fully functional technical solution for the management of education finance. The novelty of this research is in the integration of the crowdfunding method into an e-wallet platform that is specifically intended for tuition fee payment in a university setting, with an automatic fund disbursement system to the institution's account and provision of education-specific transparency data. This differentiates it from general crowdfunding platforms that lack this kind of specialization and direct integration. The main contribution of this research is to the technical aspects of application development, including system architecture, feature implementation, functional and non-functional testing, to provide a reference model for future similar systems.

## Methodology

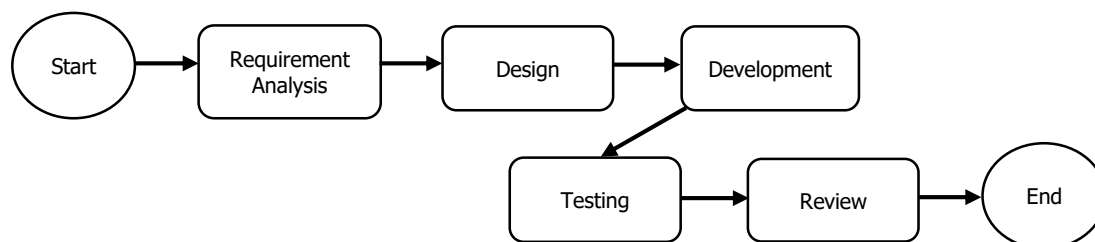
This research uses a prototype development approach with Agile methodology. This iterative and flexible approach was chosen to enable rapid adaptation to needs and feedback during the development process [12], [13], [14]. The object of the research is a prototype of an e-wallet management application for crowdfunding-based tuition payments at STMIK Bandung Bali.

System analysis and design using the Unified Modeling Language (UML) to visualize the architecture, workflow, and interactions between system components [15]. Development of a web-based application prototype was carried out using the Codeigniter framework version 4.6. Payment integration is done through the Duitku payment gateway that supports Application Programming Interface (API) disbursement of funds directly to bank accounts. Data on study history, grades, and tuition payment bills of STMIK Bandung Bali students are used for data simulation in prototype development and testing.

The research implementation follows the Agile cycle which consists of several stages: [16]:

1. Needs Analysis: Identification of functional needs includes donor registration, donation submission, student data management, payment, fund withdrawal. Non-functional needs includes security, ease of use, application performance based on tuition fee issues, crowdfunding potential, and specific needs of STMIK Bandung Bali. Data was collected through literature study and user needs analysis.
2. Design: Designing the application architecture, database model, user interface (UI) design, and system workflow using UML diagrams. The focus of design is on the main features that support interactions between students, donors, and the campus in the process of crowdfunding tuition payments and e-wallet management.
3. Implementation: Development of a web-based application prototype in accordance with the design specifications that have been made. This stage includes the implementation of application features and integration with the payment gateway API to facilitate donation and fund disbursement transactions.
4. Testing: Functionality testing of the application prototype utilized the black-box testing method. The predefined test scenarios covered various aspects of functionality, including registration, donations, payments, withdrawals, and notifications. The purpose of the testing was to verify that the application functioned as required.
5. Evaluation: Analyze the test results to identify the successes and failures of each test scenario. This evaluation aims to ensure that all features are working as expected and to identify potential improvements or further development on the prototype.

The main parameter observed during functional testing is the level of successful execution of each predefined test scenario. This includes verification of the suitability between input and expected output, successful integration with the payment gateway in conducting donation and fund disbursement transactions, as well as the validity and accuracy of the data displayed in the application. Non-functional testing is done by testing system load and evaluation by users. The flow of the agile method can be seen in [Figure 1](#).



**Figure 1.** Agile method

## Results and Discussions

### *Analysis of the running system*

Currently, the tuition fee payment system at STMIK Bandung Bali still relies on manual processes or separate and unintegrated systems between bills and payments. Students must face challenges in accessing payment information, while the administration has difficulty managing efficiently and transparently. The use of E-Wallet technology is currently not fully integrated with the tuition payment system, so the efficiency and connection between students and the administration can still be improved. A more inclusive and sustainable payment model through the crowdfunding method has also not been implemented. Crowdfunding can be a solution to expand community participation in supporting the sustainability of higher education.

In answering these challenges, this research will propose an experimental research methodology approach. The experimental method allows for direct testing and evaluation of the effectiveness of the application of methods and technologies in the development of an integrated tuition payment system. The application of E-Wallet technology and crowdfunding methods will be carried out by designing and developing system prototypes.

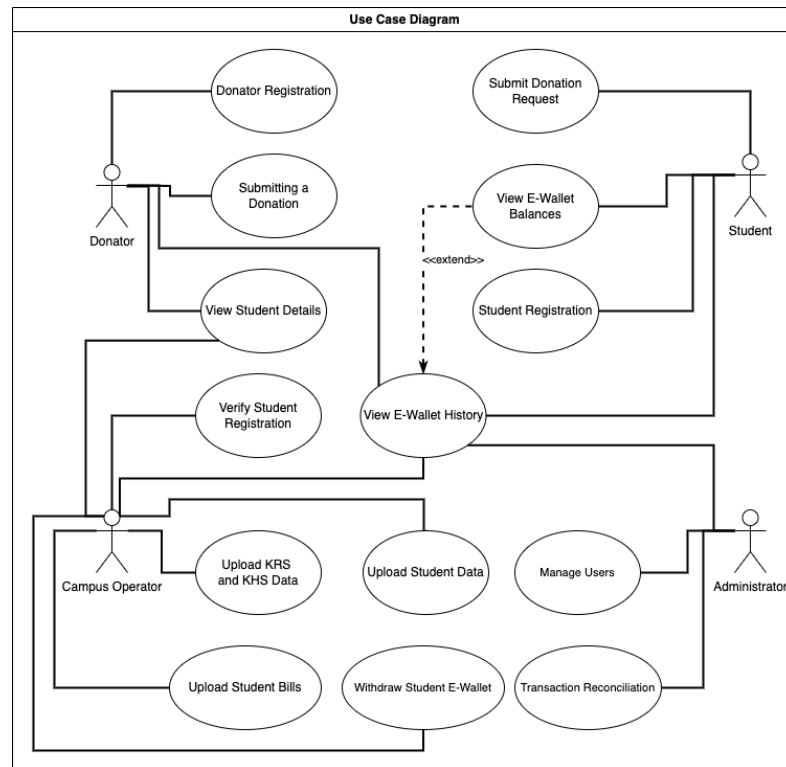
### *System Design and Development*

In the analysis and design using UML tools. From the results of surveys and interviews [\[15\]](#), the resulting analysis of functions and users is described in the form of use cases in [Figure 2](#). A total of 4 actors are involved:

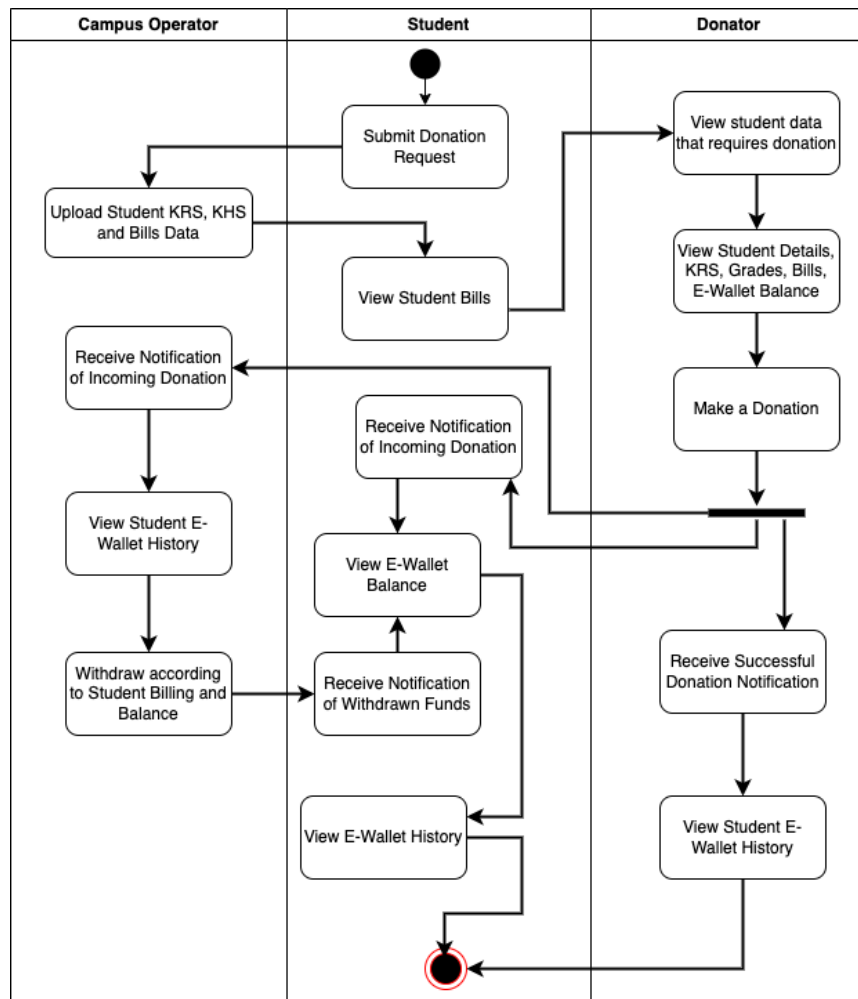
1. Administrators can register campus operators and reconcile donation and withdrawal transactions.
2. Campus operators can upload student data, verify students, and withdraw funds according to bills. Upload Study Plan data and Study Result or Academic Transcript data needed for information to donors, that it is true that the student who will be given a donation is studying at STMIK Bandung Bali. The data can also be used by donors to analyze students ranging from college activeness, grades to GPA obtained.
3. Donors can view student data, study history, bills or the amount of funds needed by students, the amount of donations that have been obtained by students, make donations, and view donation history.
4. Students can view tuition bills, nominal donations given by donors, view the transaction history of incoming and outgoing money, and view E-Wallet balances.

The entire flow of activities is depicted in the form of an activity diagram in [Figure 3](#). Students make donation requests to the campus, then the campus will upload student data including bills that will be seen by donors. Donors who will make donations can see student data.

Then the donor can make a donation. If the donation has been entered, there will be a notification to the student and the campus. The campus can disburse funds according to the bill and incoming donations.

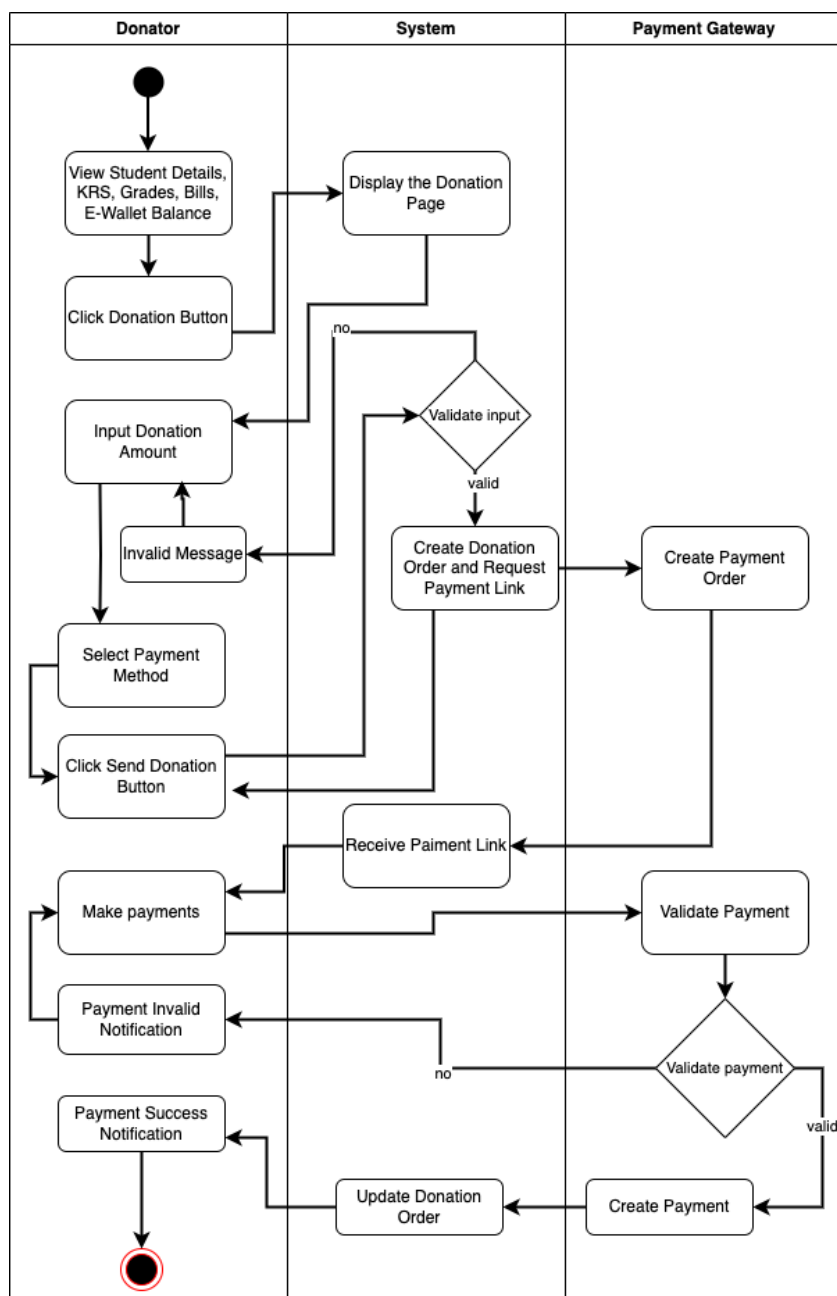


**Figure 2.** Use case diagram E-Wallet management application



**Figure 3.** Activity diagram overall

How to donate can be seen in [Figure 4](#). Donors view student details and then press the donate button. The donor enters the donation amount and selects the payment method. This payment method is provided by the payment gateway. Each payment method has a different payment fee depending on the payment method chosen by the donor. The payment fee is determined by the payment gateway provider. The donor then presses the send button, then the system will interact with the payment gateway via API. Payment Gateway will create a payment link and display the payment page. After the donor successfully makes a payment, the payment gateway will make a call-back to the E-Wallet management application and process the donation transaction that has been stored in the database.



**Figure 4.** Activity diagram of sending donation

Withdrawal of donation funds is carried out directly by the campus through the campus operator. Withdrawal funds will be automatically sent to the registered campus account, so it cannot be transferred to another account. Fund disbursement requests will be validated by the system before the disbursement request is processed. The validation carried out is checking the E-Wallet balance, and checking the balance on the payment gateway. If all are valid, the payment gateway will process automatically and transfer the amount of funds available in the student's e-wallet and not greater than the total student bill to the registered campus account.

### Implementation

This E-Wallet application is web-based. The front page uses one page that contains the Home, About Us, Donate, Services and Contact Us sections. There is a login button in the header that can be used by user login donors, campus operators and students. In the Donation section, a list of students who received donations is displayed. To be able to make a donation, donors must go through the login process. The front page can be seen in [Figure 5](#) dan [Figure 6](#).



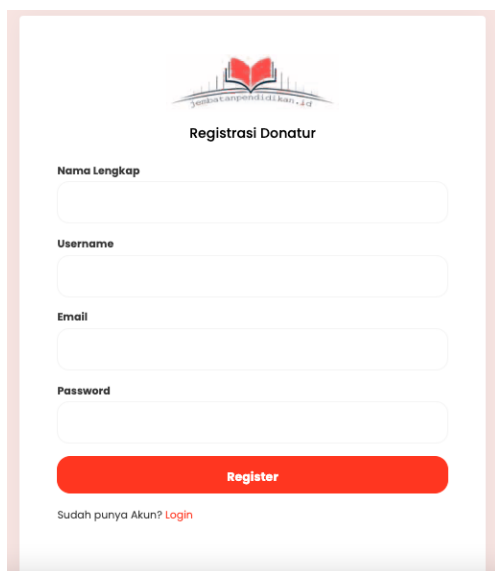
Figure 5. Top Front Page



Figure 6. List page of students who receive donations

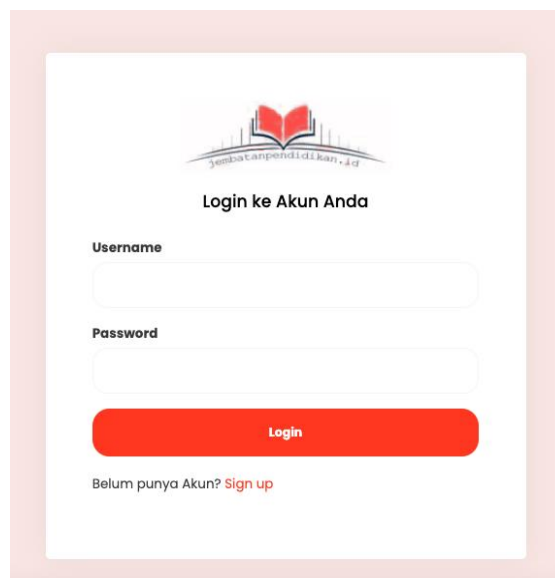
Donors can register on the registration page as shown in Figure 7. Donors who have registered can log in on the login form depicted in Figure 8. Donors who have logged in will be directed to the dashboard page. The menus that can be accessed by donors are the Student Menu to see the details of students who receive donations; the Transaction Menu to see a list of transactions that have been made by donors, be it successful transactions, pending transactions or canceled donation transactions. The donor dashboard page displays the total donations that have been successfully made and the donation history. The donor dashboard page can be seen in Figure 9.





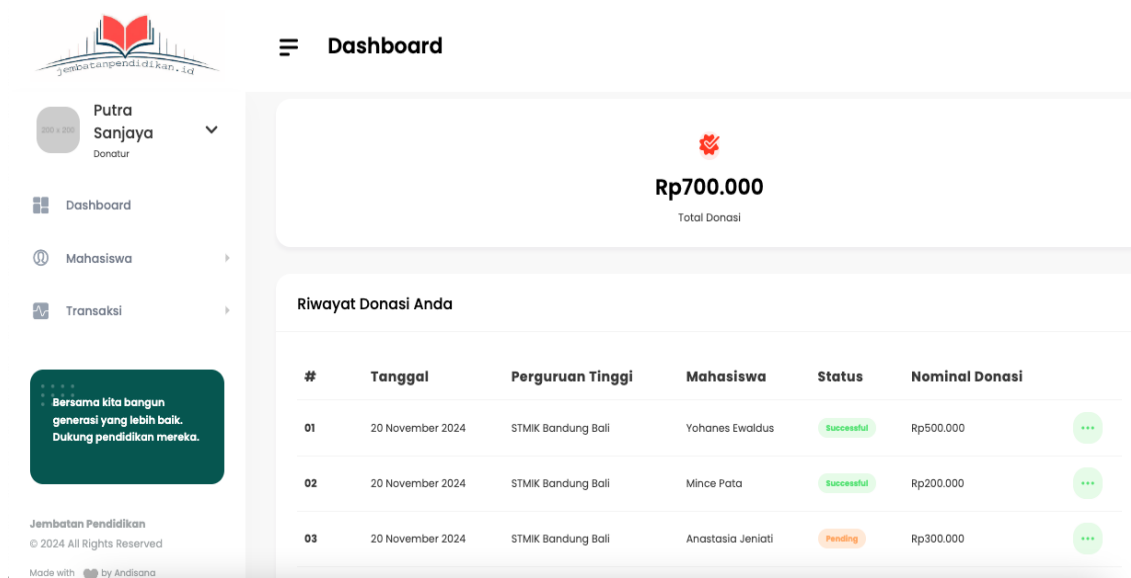
The registration form for donors includes a logo at the top, the title "Registrasi Donatur", and input fields for "Nama Lengkap", "Username", "Email", and "Password". A red "Register" button is at the bottom, with a link "Sudah punya Akun? Login" below it.

**Figure 7.** Donator registration form



The login form features the same logo and title "Login ke Akun Anda". It has input fields for "Username" and "Password", followed by a red "Login" button. A link "Belum punya Akun? Sign up" is located at the bottom.

**Figure 8.** Login form



The donor dashboard shows the user's profile "Putra Sanjaya" and a sidebar with navigation options: Dashboard, Mahasiswa, and Transaksi. The main content area displays the "Total Donasi" as "Rp700.000" and a table of donation history.

#	Tanggal	Perguruan Tinggi	Mahasiswa	Status	Nominal Donasi
01	20 November 2024	STMIK Bandung Bali	Yohanes Ewaldus	Successful	Rp500.000
02	20 November 2024	STMIK Bandung Bali	Mince Pata	Successful	Rp200.000
03	20 November 2024	STMIK Bandung Bali	Anastasia Jeniati	Pending	Rp300.000

**Figure 9.** Dashboard donatur

Donors can select students to donate to. The application will redirect to the student details page which contains information about the student. The information displayed on the student details page is a photo, name, study program, campus name, and study information, as well as the value and amount of the bill, which can be seen in [Figure 10](#). The donor presses the donation button, then is directed to the donation nominal input page as shown in [Figure 11](#). On the page there is a button that contains a nominal that can be selected directly, or the donor can input another nominal as desired. On the next page ([Figure 12](#)), Donors are directed to choose a payment method. Each payment method has a different fee that has been set by the payment gateway provider. The fee is charged to the Donor. If the Donor has chosen a payment method, the total amount to be paid will be calculated. After the Donor presses the Pay button, the application will communicate with the payment gateway using the API, then the application page will redirect to the payment page provided by the payment gateway provider, ([Figure 13](#)). Payment has a waiting time, if it exceeds that time, then the donation is considered canceled and the donation status in the application becomes canceled. When the Donor successfully makes a payment, the payment gateway will make a call-back to the E-Wallet management application



and process the Donation to enter the E-Wallet balance of the donated Student. The E-Wallet display can be seen in [Figure 14](#).

Education

**YOHANES EWALDUS**  
Prodi: Teknik Informatika

0%  
Diterima **Rp0** Target **Rp5.000.000** **Donasi**

**Kampus:**  
**ITMIK Bandung Bali**  
Jl. Bypass Ngurah Rai No. 21,  
Kedonganan, Badung.

**How Your Donation Makes A Difference**  
**Donation**

**Recent Donors**  
Be The First

**Figure 10.** Form student detail

Notice: Test mode is enabled. While in test mode no live donations are processed.

**Rp 200000**

Rp20.000 Rp50.000 Rp100.000 Rp150.000

Rp200.000 **Nominal Lain**

**Berikutnya Metode Pembayaran**

**YOHANES EWALDUS**

0%  
Diterima - Rp0 Target - Rp5.000.000

**Kampus:**  
**ITMIK Bandung Bali**  
Jl. Bypass Ngurah Rai No. 21,  
Kedonganan, Badung.

**Figure 11.** Form input donation amount

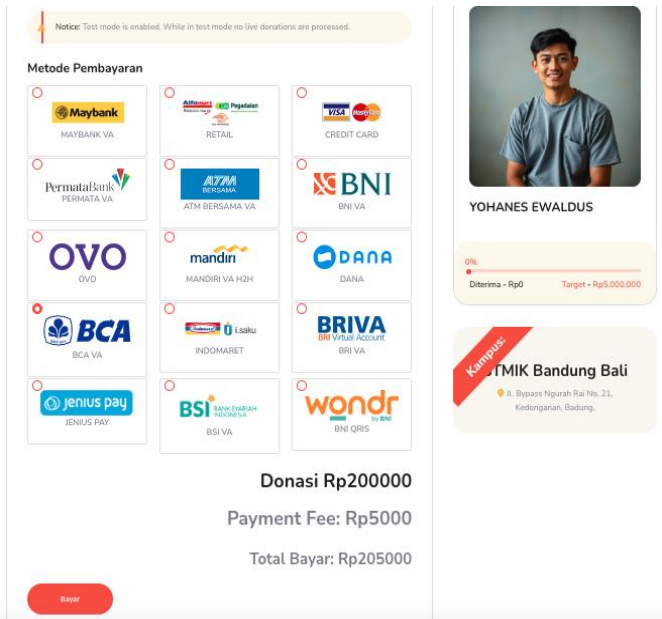


Figure 12. Payment method selection

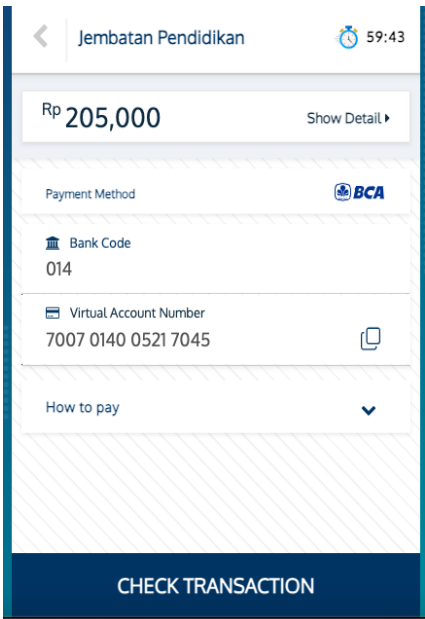


Figure 13. Payment form

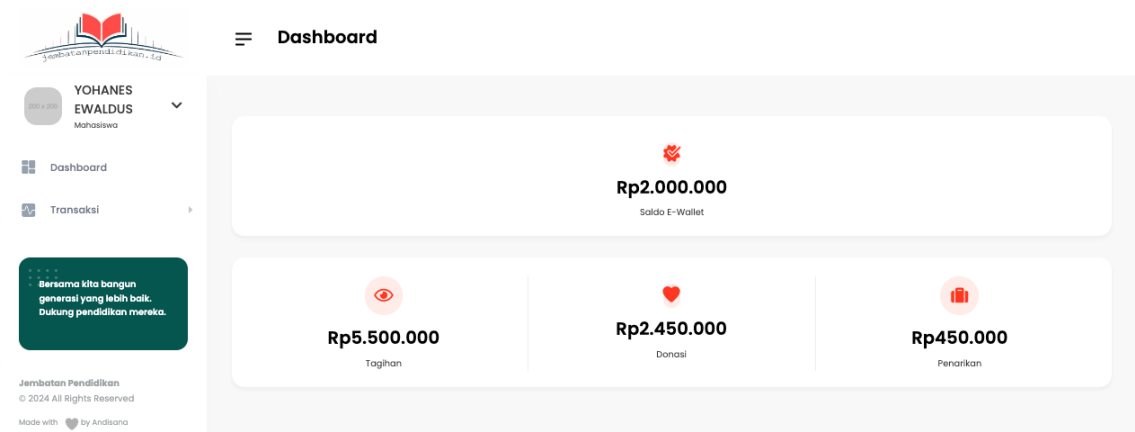


Figure 14. Student E-Wallet

Testing

Functional Testing

Testing in this study uses the black-box method, which plans test case scenarios and expected results [17]. The test scenarios carried out are Donor Registration, Donors View Student Details, Campus Operators Upload KRS and KHS Data, Campus Operators Upload Bills, Donors Send Donations, Donors Make Payments, Students View E-Wallet Balances, Campus Operators Withdraw Student E-Wallets, Students View E-Wallet History. The test results can be seen in Table 1.

**Table 1.** Blackbox testing

No	Scenario	Test Case	Expected Result	Result
1	Donator Registration	Prospective donors do not have an account and register	Donor account data is entered into the database and donors can login.	Succeed
2	Donator View Student Details	Donor chooses one of the students who needs donation	The student details page appears with the appropriate information	Succeed
3	Campus Operator Upload KRS and KHS Data	Operator uploads student KRS and KHS data	Student KHS and KRS data appear on the student details page	Succeed
4	Campus Operator Upload Bill	Operator uploads student bill data	Student bills appear on the donation details page	Succeed
5	Donator Submitting a Donation	Donors choose one of the students and enter a donation of 500,000. Choose BCA Virtual Account payment method	Donation transaction data is created and the payment page appears	Succeed
6	Donator do Payment	Donor makes payment by transferring to BCA Virtual Account	The payment is successfully received, the donation transaction is recorded and the student's E-Wallet balance is increased.	Succeed
7	Student View E-Wallet Balance	Students open the E-Wallet page and view the balance	The E-Wallet page opens and the balance appears according to the transactions that have occurred	Succeed
8	Campus Operator Withdraw Student E-Wallet	Campus Operator withdraws funds from students amounting to 500,000	The student's E-Wallet balance was reduced and the registered account received a transfer of 500,000	Succeed
9	Student View E-Wallet History	Students open transaction history on their E-Wallet	Display E-Wallet history according to transactions that have been made	Succeed

### System Load and Stress Testing

Load and stress tests were conducted for 60 seconds per scenario using Apache JMeter to measure the performance and resilience of the system [18], particularly the donation functionality, under increased concurrent user load. The system was deployed on shared hosting with limited specifications: 0.5 Core Max CPU, Max 256 MB RAM, 10 Entry Processes, and 15 NPROC (Number of Processes). This test aims to identify bottlenecks and system failure points. The test results are summarized in Table 2.

**Table 2.** System Load and Stress Test Results

Requests	Error %	Average Response Time (ms)	Throughput (Transactions/s)	Network Received (KB/sec)
50	0.00%	2129.88	0.8	17.86
100	1.00%	2231.64	1.63	36.31
200	5.50%	14674.63	2.56	54.87
300	3.33%	30856.29	2.68	58.5
400	95.25%	71789.92	2.97	10.69
500	96.40%	72462.54	3.71	12.52

### *Evaluation of Effectiveness, Usability, and User Trust*

This evaluation was conducted through a questionnaire survey with three main user groups: students, donors, and campus operators. A total of 16 respondents participated in this evaluation, consisting of 10 students, 5 donors, and 2 campus operators. The questionnaire was designed to collect data on:

1. Effectiveness: The extent to which the system fulfills its primary purpose and helps users accomplish their tasks.
2. Usability: Ease of learning and using the system, navigation, and overall user satisfaction.
3. User Trust: Users' perceptions of data security, system reliability, and validity of the information presented.

A Likert scale (1=Strongly Disagree, 5=Strongly Agree) was used to measure the respondents' level of agreement with certain statements. The evaluation results are presented in [Table 3](#).

**Table 3.** Average Effectiveness, Usability, and User Trust Evaluation Score

Evaluation Category	Score Average (Students, N=10)	Score Average (Donors, N=5)	Score Average (Operators, N=2)
Effectiveness	4.2	4.6	4.0
Usability	4.0	4.2	3.5
User Trust	3.8	4.0	3.0

### **Discussions**

The results of black-box testing in [Table 1](#) show that this prototype of an e-wallet management application for crowdfunding-based tuition payments functions in accordance with the designed requirements and specifications. The successful execution of all test scenarios indicates that the main features of the application, from user registration to the donation and withdrawal process, have been implemented properly.

The system load and stress test results in [Table 2](#) show the limited capacity of the system in a limited shared hosting environment:

1. At 50-100 requests, the system demonstrates optimal performance with minimal error rates (0.00% at 50 requests, 1.00% at 100 requests) and average response times below 2.2 seconds. Increased throughput indicates the system's initial ability to handle the load.
2. Significant degradation begins at 200-300 requests. Response times drastically jump (>14 seconds at 200 requests, >30 seconds at 300 requests), accompanied by an increase in error rates (5.50% at 200 requests). This is attributed to resource limitations (Max CPU 0.5 Core, Max RAM 256 MB, Entry Processes, and NPROC), hindering simultaneous request processing.
3. Total system failure at 400-500 requests. Error rates skyrocket above 95%, with average response times exceeding 71 seconds. A sharp decline in network traffic (around 10-12 KB/sec) confirms server incapacitation, indicating an inability to effectively process or send/receive data due to severe resource starvation.

The evaluation results of 10 students, 5 donors, and 2 campus operators in [Table 3](#) show a generally positive perception of the system. The effectiveness aspect was rated highly by all three groups (students 4.2, donors 4.5, operators 4.0), indicating the system's success in meeting

core functional needs and supporting the designed workflows, such as the donation process, donation tracking, and fund withdrawal. Usability was also rated favorably by the majority of respondents (students 4.0, donors 4.2), with an intuitive interface and efficient process flow. There were suggestions for improvement of the administration features (operator 3.5). The level of user trust showed variation; donors (4.0) showed good trust in the transparency and security of donations, students (3.8) had doubts regarding data privacy, and operators (3.0) emphasized the importance of sensitive data security. Comprehensively, the evaluation showed good system acceptance, but highlighted crucial issues such as data privacy and administrative feature enhancements as the focus of further development to build trust and long-term user experience.

One important finding is the transparency of student data (study data, grades, and bills) presented to donors before they make a donation. This feature answers the need for clear and accountable information, which can increase donor trust and participation in supporting student education.

The payment gateway integration (Duitku) successfully facilitates the automated and real-time donation payment process, and enables the disbursement of funds directly to the campus account. This automation reduces the potential for manual errors and increases transaction efficiency, which is a significant advantage over traditional tuition fee payment systems that are often manual and time-consuming. Research on payment gateway adoption in the context of digital finance shows that the ease and security of transactions offered can increase user participation [19].

The student e-wallet management feature allows students to see the funds collected transparently [20] and campus operators to withdraw funds according to the bill. The centralized withdrawal system to the campus account also provides better control and accountability in the management of donation funds.

This prototype integrates multiple layers of security to safeguard sensitive data and transaction integrity:

1. Use of Private Key for Payment Gateway API: All communication with the Payment Gateway Provider is facilitated through a secure API, where authentication is performed using a private key exclusively provided by the Payment Gateway Provider.
2. Password Encryption with AES (Advanced Encryption Standard): User passwords are stored in the database after being encrypted using the AES algorithm. With this encryption, if the database is successfully accessed unauthorizedly, the user password cannot be read in its original form.
3. Restriction of Access to Sensitive Data: Access to grade details and student data is restricted to registered donors only. This ensures that students' financial information and personal data are not exposed to the public or unauthorized parties.

## Conclusion

This research successfully designed and developed a prototype of an e-wallet management application for crowdfunding-based tuition payments at STMIK Bandung Bali, utilizing the Agile software development method. Its core functionalities, including student data integration and transparent transaction processes, were successfully implemented.

Functional testing yielded a 100% success rate across all 9 black-box test scenarios. However, load and stress tests revealed significant performance limitations on shared hosting (0.5 CPU, 256 MB RAM). While optimal below 100 requests per minute, response times drastically degraded at 200 requests, and the system experienced complete failure above 400 requests, indicating a critical need for enhanced resources.

Empirical user evaluations involving 10 students, 5 donors, and 2 campus operators confirmed the system's effectiveness and usability, with average scores of 4.2 and 4.0 respectively (on a 5-point Likert scale). Security was addressed through private key API integration, AES password encryption, and restricted sensitive data access.

Technically, this prototype validates the crowdfunding-based e-wallet as a tuition payment solution and offers a reference model for educational institutions. Future work should focus on production-ready implementation, comprehensive testing, and further integration for broader application.

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3. P3M STMIK Bandung Bali.

## References

- [1] Badan Pusat Statistik Provinsi Bali, "Keadaan Ketenagakerjaan Provinsi Bali Agustus 2023," Badan Pusat Statistik Provinsi Bali, Denpasar, 2023.
- [2] Y. Rachmawati, H. Wilson, F. W. R. Dewi, M. Silviana and R. Sulistyowati, Statistik Penunjang Pendidikan 2018 (Hasil Susenas Modul Sosial Budaya dan Pendidikan, Jakarta: Badan Pusat Statistik, 2019.
- [3] N. R. Sari, F. W. R. Dewi, G. Anggraeni, G. Sulistyowati and N. P. Sulistyowati, Statistik Penunjang Pendidikan 2018 (Hasil Susenas Modul Sosial Budaya dan Pendidikan), Jakarta: Badan Pusat Statistik, 2022.
- [4] STMIK Bandung Bali, "Laporan Keuangan Tahun Buku 2024," STMIK Bandung Bali, Denpasar, 2024.
- [5] N. Susanti, D. D. Asmarita and N. Maynaki, "Edukasi dan Pemanfaatan Fintech (Aplikasi Wallet) Dalam Pengelolaan Keuangan Pada Usaha UMKM Hot Geprek Jaja\_nandiana," *Jurnal Dehasen Mengabdi*, vol. 1, no. 2, pp. 121-126, 2022.
- [6] R. Syah, M. K. M. Nasution, E. B. Nababan and S. Efendi, "Aplikasi Mobile Wallet Menggunakan Teknik Personal Financial Management (PFM) Pendukung Kecerdasan Bisnis," in *Prosiding Seminar Nasional Riset Information Science (SENARIS)*, Medan, 2019.
- [7] D. S. Soegoto and M. P. Tampubolon, "E-Wallet as a Payment Instrument in the Millennial Era," in *IOP Conference Series: Materials Science and Engineering*, 2020.
- [8] A. Light and J. Briggs, "Crowdfunding Platforms and the Design of Paying Publics," in *Conference on Human Factors in Computing Systems - Proceedings*, Colorado, 2017.
- [9] F. Abdilah and E. Danial, "Crowdfunding: demokratisasi akses keuangan dalam mendukung aksi sosial mahasiswa," *Jurnal Ilmiah Mimbar Demokrasi*, vol. 15, no. 1, pp. 1-15, 2015.
- [10] A. F. Aysan and M. F. Syarif, "Crowdfunding and Digital Innovation for Sustainable Development in Asia and the Pacific," *Asia-Pacific Tech Monitor*, vol. 3, no. 1, pp. 42-50, 2024.
- [11] N. A. B. Sabarudin, S. B. Alma'amun and R. Ahmad, "Analysing Educational Campaign's Outcome in Donation-based Crowdfunding: Social Capital as a Determinant Factor," *International Journal of Business and Society*, vol. 22, no. 2, pp. 862-880, 2021.
- [12] A. D. Inayah, "Analisis Tinjauan Implementasi Metode Agile Dalam Manajemen Proyek Sistem Informasi," *Jurtikom*, vol. 1, no. 2, pp. 58-63, 2024.
- [13] R. Wicaksono and U. Chotijah, "Sistem Informasi Tagihan Hippam Desa Leran Berbasis Website Dengan Metode Agile Software Development," *Jurnal Ilmiah ILKOMINFO*, vol. 6, no. 1, pp. 45-53, 2023.
- [14] A. S. W. Jelantik, P. T. H. Permana and N. M. Estiyanti, "Analisis dan Perancangan Sistem Poin of Sales Menggunakan Metode Agile Development Pada Toko Eka Putra Sukawati," *Jurnal Ilmiah Teknik Informatika dan Sistem Informasi*, vol. 10, no. 2, pp. 185-189, 2021.
- [15] H. Koç, A. M. Erdoğan, Y. Barjakly and S. Peker, "UML Diagrams in Software Engineering Research: A Systematic Literature Review," in *The 7th International Management Information Systems Conference*, 2021.
- [16] L. W. Silvana, W. Agustiono and F. A. Mufarroha, "Implementasi Payment Gateway Pada Marketplace Digital Product Berbasis Website Dengan Menggunakan Metode Agile," *Jurnal of Scientech Reserch and Development*, vol. 6, no. 2, pp. 451-464, 2024.

- [17] T. S. Jaya, "Pengujian Aplikasi dengan Metode Blackbox Testing Boundary Value Analysis (Studi Kasus: Kantor Digital Politeknik Negeri Lampung)," *Jurnal Informatika: Jurnal Pengembangan IT (JPIT)*, vol. 6, no. 2, pp. 45-48, 2018.
- [18] B. Erinle, *Performance Testing with JMeter 3*, Birmingham: Packt Publishing Ltd, 2017.
- [19] D. A. Lestari, E. D. Purnamasari and B. Setiawan, "Pengaruh Payment Gateway terhadap Kinerja Keuangan UMKM," *Jurnal Bisnis, Manajemen, dan Ekonomi*, vol. 1, no. 1, pp. 1-10, 2020.
- [20] M. Fanea-Ivanovici, "Transparency of Financial Information on Crowdfunding Platforms – A Prerequisite for Successful Funding Campaigns," in *International conference Knowledge-Based Organization*, 2018.

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