Jurnal Mantik
Volume 4, Number 1, May 2020, pp. 926-935 E-ISSN 2685-4236
https://iocscience.org/ejournal/index.php/mantik

Application On Payment UPS Online For Students Android-Based National University Information System

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ARTICLEINFO

Article history:
Received: 04/04/2020
Revised: 20/4/2020
Accepted: 30/5/2020

Keywords:
Android,
Midtrans API,
UPS Payment,
Payment Gateway.

ABSTRACT

In every educational institution, it certainly has its own tuition payment system. Along with the rapid advancement of technology and information at this time, certainly needed an effective and efficient and relevant system which will make these institutions can compete with other institutions. At the National University lecture payment and verification of lecture payments are still done conventionally, ie students make transfers or cash deposits to the Bank in collaboration with the campus, then students need to show proof of physical payment to campus staff (BAK) for verification which is assessed less efficient. With these problems, the author in his research intends to design an online UPS payment application based on Android and integrated with the Midtrans API. Midtrans API is used to improve payment service performance and make it easier for students to make UPS payments on mobile. In this research, several types of programming languages are used, including PHP, Java, and MySQL, accompanied by the use of the waterfall method. The Waterfall method is used as a system development method which is carried out systematically, starting from planning to testing the system. The reason the author uses the waterfall method is that it can facilitate the management and design requirements (needs) of the system created. With this research the author hopes to produce convenience for students in making payments to UPS verification through an online UPS payment application.

1. Introduction

Along with the development of technology and information today has created a new business opportunity where business transactions can now be done electronically without knowing the distance and time. With such developments certainly everyone can more easily do banking transactions. Many commercial banks in Indonesia have also implemented electronic-based banking systems to improve operations and minimize costs. Among the banking systems (transactions) carried out electronically, namely by the existence of online payment facilities or often known as E-Payment. E-Payment is an option in making payments online which uses internet facilities so that transactions can take place. Electronic payment methods like this can often be found in several well-known E-Commerce companies with the aim of providing security guarantees in conducting transactions between sellers or buyers. To be able to guarantee the security of these transactions, the related company cooperates with banking institutions to facilitate fast, safe and practical electronic transactions.

Payment system UPS (Semester Money Package) at the National University of Jakarta to date collaborates with Bank BRI. Where the process of carrying out payment UPS (Semester Package Money) is done in the conventional way. UPS is one of the requirements to fulfill the student registration requirements for the semester that will run.

In its implementation, Information Systems students will make UPS payments by payment via ATM (transfer) or make cash deposits to Banks that work with the campus. After a student makes a UPS payment to the bank, students need to first show proof of payment that has been made to the National University Financial Administration Bureau (BAK) before finally filling in the KRS (Study Plan Card) can be done by students for the next semester.

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This certainly raises several obstacles in the implementation process, such as the long queue at BRI Bank until the students will verify the proof of UPS payment to the BAK. To overcome this problem, in the application design that was made also applied the FIFO (First In First Out) method. The method is implemented to overcome the queue density, so that it can minimize the time for the admin in verifying student payments.

Based on these problems, the author in his research in improving the performance of payment services, proposes the design of an Android-based online UPS payment application that uses the Payment Gateway service as an intermediary for payment confirmation students conducted through mobile apps. This automatic payment system uses the Payment Gateway provided by Midtrans. With the aim to help students in particular the Information Systems study program in making it easier to do UPS payment activities with an easier and more practical process. Android platform was chosen because currently the average student is very familiar with the use of Android. This certainly becomes more points that Android can offer good performance in their daily use.

Some of the previous studies used as a reference in this study include: research conducted by Lusiana Efrizoni, Yoyon Efendi, and Rhendy Kartana Soemanov about the use of Virtual Accounts and Digital Tracer in the payment of school fees based on Android. Based on the results of research conducted, the application design with the Android platform and implementing Virtual Account and Digital Tracer can assist the treasurer in checking and validating SPP fee payments [1].

Furthermore, research conducted by Dinda Amaniska, Lindawati, and Martinus Mujur Ros about the design of an Android-based online UKT payment system with a case study in Sriwijaya State Polytechnic. In this study against the background of UKT payment system problems that are applied are still carried out conventionally, the authors designed a UKT online payment application based on android using the Waterfall method to facilitate students in making UKT payments and facilitate the Admin in performing the update function to update information related to UKT payments [2]

Further research viz research conducted by Dina Maulina and Tri May Mega Puspasari. In his research the author developed a marketplace that is Travnesia.com. The development was carried out in order to improve service performance, especially in making it easier for users (customers) to make transactions safely. In this study the authors explain that the transaction process that occurs online using Payment Gateway can occur safely [3].

2. Literature Review

2.1 Payment Gateway

Payment Gateway is a service that is often used in E-Commerce stores. Payment Gateway is used to authorize payments in the form of digital transactions. Payment Gateway is now one of the payment methods that is often found to make payments for transactions that occur online. Payment Gateway is a service in authorizing payments either through credit cards or other payment methods, such as bank transfers between the seller and the buyer [4].

2.2 First In First Out (FIFO) Queue Method

The FIFO (First In First Out) method is a method which is usually applied to overcome the problem of queuing. This method works by the way the process is first entered, it is assumed that the process will come out the first time. FIFO applies the concept of Queue algorithm which in its use has sequential properties, but remains in the flow according to what was first entered and then processed in turn. The Queue algorithm runs by performing insertion operations only on one side (called the back or rear) and deletion operations only on the other side (called the front or front). Related to this research,

2.3 Mobile Application

Mobile Application (Mobile Application) is an application that can enable its users to carry out daily activities using mobile telephone equipment (mobile phones) or at this time often referred to as smartphones. With the existence of a mobile application, it can make it easier for humans to do a series of activities in the form of entertainment, browsing, learning, banking transactions, and various other activities [6].

2.4 Midtrans API

Midtrans is one of the many Payment Gateway service providers in Indonesia. By using Midtrans, the payment process will become easier and integrated online with websites and mobile

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apps. Midtrans API key used to be able to connect to websites and mobile apps that will be used to be able to do banking transactions online [7].

3. Research methodology

3.1 Study of literature

Literature studies conducted by the author to obtain theoretical knowledge sourced from articles, the internet, books, previous research journals, and other references available both online and offline related to the research conducted.

3.2 Discussion Method

The author conducts consultations and discussions with the Final Assignment lecturer (TA) about system design, discussion of the theory, and problems encountered when the process of conducting research and reports are made.

3.3 Systems Development Method

In designing this E-UPS UNAS application, the author applies the SDLC (System Development Life Cycle) approach to the Waterfall model.Waterfall is a modeling of system development which is done systematically. This approach is often used in the software industry to develop various projects ranging from small scale to large scale projects. In Figure 1 is the stage in the Waterfall method.

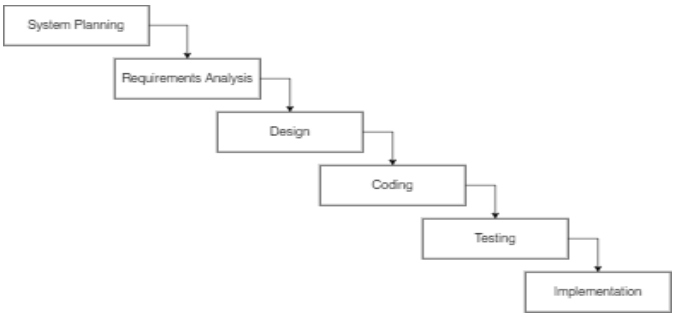

Figure 1. SDLC Model Waterfall

4. Results and Discussion

4.1 System analysis

This section will discuss the analysis of the system including:

4.1.1 Analysis of Functional Requirements in the System

In the analysis of functional requirements the system will describe the functions that must be able to be done in the design of the E-UPS UNAS application, including:

1. This mobile application involves two users, namely students and BAK admins. Students can access the application via smartphone (android), while for BAK admins through the website in verifying payments and making reports.
2. By implementing Midtrans Payment Gateway, students can make UPS payment transactions online.
3. Students can upload their personal data, files (proof of payment or receipt), and need to be accompanied by including the Order ID obtained when making payments using Payment Gateway to the Server.
4. Students can get a message in the form of an email that has been included if the UPS payment has been verified by the admin.
5. Admin or BAK get a midtrans account which is used to check data (reports) of payments that have been entered.
6. Admin or BAK can verify payments made by students through the web, make payment reports, and send messages in the form of emails to students concerned if the payment has been verified.

4.1.2 Analysis of Non-Functional Requirements for the System

Analysis of non-functional requirements of the system is carried out in order to describe the specification requirements needed in designing the system so that the system can work well.

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a. Software Specifications
   1. Microsoft Windows 10 64 Bit Operating System.
   2. XAMPP Version 7.4.6.
   3. Hosting service provider (000webhost.com), has a Domain, and MySQL that is useful as a database server.
   4. Sublime Text 3.
   5. Android Studio 3.6.2.
   6. The latest Google Chrome or Mozilla Firefox browser

b. Hardware Specifications
   1. Laptop with a minimum of Processor i3-3217U @ 1.8GHz.
   2. Minimum RAM (Random Access Memory) with a capacity of 4GB.
   3. Minimum hard drive with a capacity of 500GB.
   4. Minimum 1GB VGA.
   5. Internet connection.

c. Android specifications

   To run a mobile program that is created, it requires a minimum of specifications Android Lolipop API 5.0.0 API 21 to the latest version.

4.1.3 Analysis of Midtrans Payment Methods

This payment method analysis discusses applications that use midtrans as a third party in terms of payment or Payment Gateway. In Figure 2 shows the Payment Gateway Midtrans transaction flow.

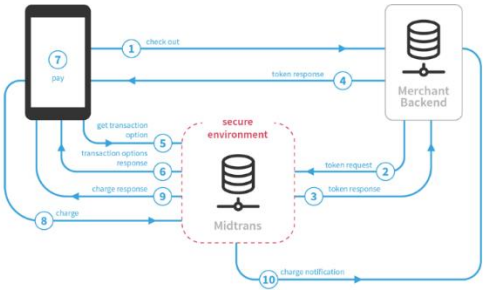

Figure 2 Flow of Midtrans Transactions

4.2 System Design

In this research, modeling design in the system design will be described using UML (Unified Modeling Language), such as:

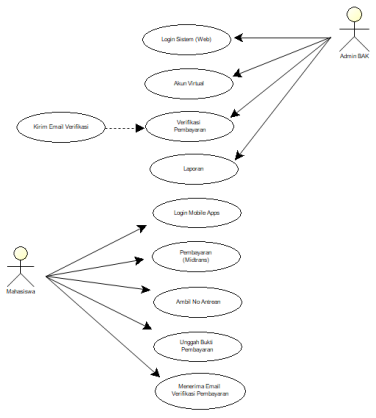

Figure 3 Use Case Diagrams for Admin (BAK) and Students

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Figure 4 Use Case UNAS E-UPS Diagram: Payment

Figures 3 and 4 show the proposed use case diagram in the UNAS E-UPS application design.

Figure 5 Activity UPS Payment Diagram

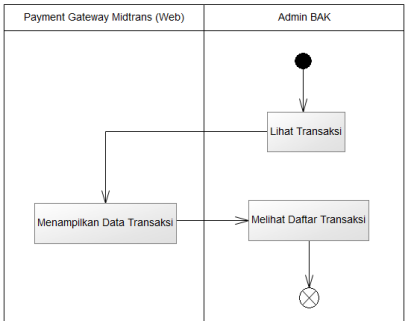

Figure 6 Payment Check Activity Diagram

In Figure 5 and Figure 6 is the design of the Activity Diagram proposed in the system design.

4.3 System Implementation

The results of the implementation of the system design on the website (admin) and android (student) for online UPS systems that have been made will be discussed in this section.

a. Appearance on the Student Side

Figure 7 the initial menu on the E-UPS UNAS application that has been made, which on this page contains a login page for the user (student). On this page students need to enter user data (NPM and Password). If you don't have an account, students can first create an account on the Sign Up menu.

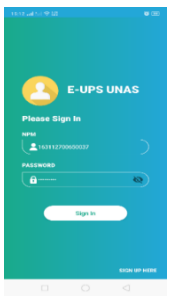

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Figure 7 Login Menu on the Student Side

b. Display Dashboard Menu

The Dashboard page (Figure 8) becomes the first interface page that will be displayed after the student has logged in. In this interface design contains information about the UPS payment period or period in accordance with the semester that will run. In addition there is a feature to retrieve a queue number, which students need to first take a queue number before finally verifying payment in the Payment Verification menu. This queue number will be used by the admin. Admin will verify the incoming payment data adjusted to the queue number that was first inputted to the server.

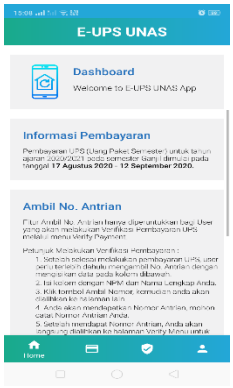

Figure 8 Dashboard Menu On Android

c. Payment Menu Display

On the payment page there are several pages after which are needed until finally displaying the Midtrans (Payment Confirmation) page.

In Figure 9 when students choose the payment menu, a list of UPS payment types based on the majors is displayed first (in this case specifically for Information Systems students). Then a page will appear containing the payment details and certain information needed (Figure 10). Afterwards, the Midtrans page will be displayed until finally payment confirmation can be seen in Figure 11 through the Mandiri bank transfer payment method.

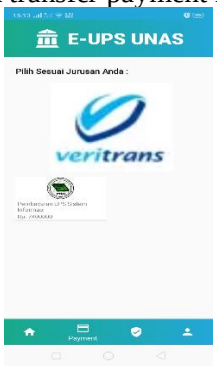

Figure 9 Payment Menu

Figure 10 Payment Details

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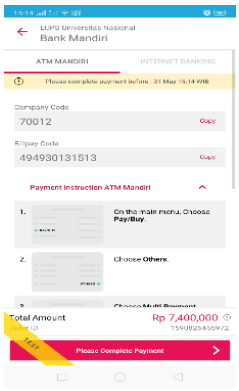

Figure 11 Payment Confirmation (Midtrans)

d. Payment Verification Menu Display (Student)

This page is for students who have already made UPS payments. After completing a UPS payment transaction, students need to first take a queue number on the Dashboard menu (Figure 8). After taking the queue number, students in verifying payment need to access this page to input certain data and proof of payment needed in the verification process.

Figure 12. Payment Verification Menu (Student)

e. Display System On Admin Side

Figure 13 shows the initial page display on the admin (web) side where the admin needs to login first before being able to access the web as a whole.

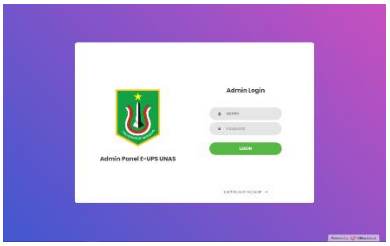

Figure 13 Login Menu On Admin Side

f. Dashboard Menu Display (Admin)

Figure 14 shows the Home view on the admin side.

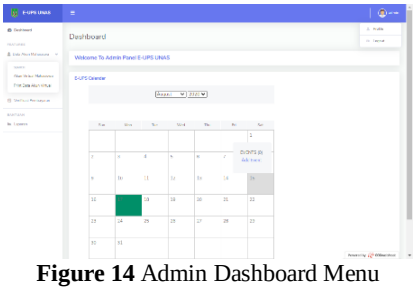

Figure 14 Admin Dashboard Menu

g. Student Account Data Menu Display

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On the Student Account Data page is divided into two sub menus namely Student Virtual Account and Print Virtual Account Data. The Student Virtual Account sub menu is a page to display user (student) data on mobile apps, while the Virtual Account Print Data is a page that functions for the admin to print student account data on the mobile apps. In Figure 15 is a page on the admin side to see student account data.

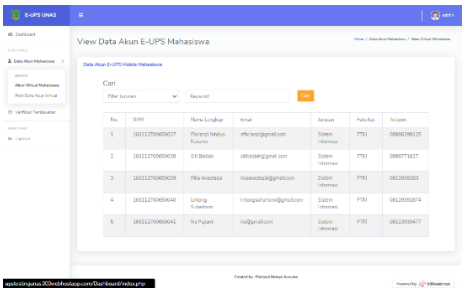

Figure 15 Menu View Data UNAS E-UPS Account

h. Payment Verification Menu Display (Admin)

On this page verification data of student payments that have been inputted via mobile apps will be saved to the server and then displayed on the website (Figure 16). On that page the admin needs to input and match the payment date on the proof of payment uploaded by the student, and change the status from 0 to 1 (Figure 17). It is intended to validate payments made by students whether they are suitable or not. If the admin has verified the payment made by the student, the payment status will change to "Already Verified" so that the admin can send an email to the student according to the email entered on the payment verification form on the mobile apps side.

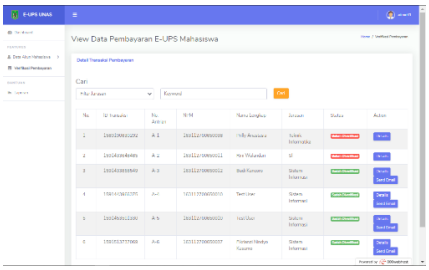

Figure 16 Verification Menu

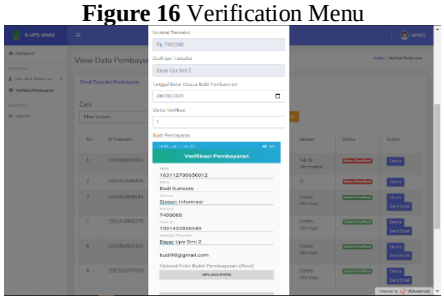

Figure 17 Payment Data Validation

i. Report Menu Display

In this page the admin can see the payment report data that is there with a filter based on a certain period of time. This filter will be based on the chosen start and end date (Figure 18). In doing report data printing, the admin can also do it using filters based on a certain period of time as well as producing report output in the form of a .pdf file. (Figure 19).

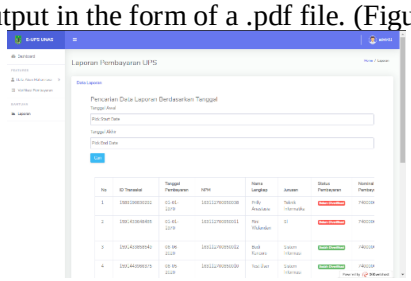

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Figure 18 Payment Report Menu

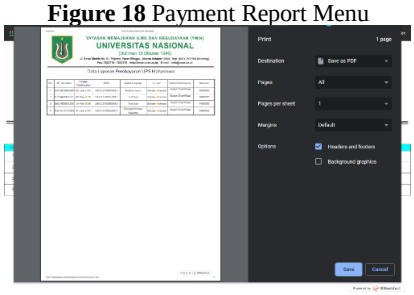

Figure 19 Print Payment Report

4.4 System Testing

In this research, the system test is done by the writer to test various elements and functions in the system design that is made so that it can be seen whether the system design is in line with expectations or not. System testing is done using the Black Box testing method. Black Box method is one method in system testing, where testing is done by testing the fundamental aspects of the system without the need to review the internal structure of the system created. Tables 1 and 2 present the results of system testing on the student and admin sides.

Table 1
Black Box Testing Results on the Student's Side

No.	Skenario Pengujian	Hasil yang diharapkan	Hasil Pengamatan
1	Input Username dan Password pada Menu Login	Sistem akan melakukan validasi akun jika benar maka akan menampilkan halaman utama (Dashboard)	Sesuai harapan
2	Registrasi pembuatan akun E-UPS baru untuk mahasiswa pada Menu Register	Sistem akan menyimpan data akun E-UPS baru untuk mahasiswa ke *server*	Sesuai harapan
3	Melakukan pengambilan nomor antrian pada halaman Dashboard	Sistem akan menampilkan halaman nomor antrian dan tersimpan pada *server*	Sesuai harapan
4	Melihat informasi data diri akun E-UPS pada Menu Profile sesuai yang diinputkan pada Menu Register	Sistem akan menampilkan informasi data akun E-UPS mahasiswa yang bersangkutan	Sesuai harapan
5	Melakukan pembayaran UPS menggunakan *Payment Gateway* Midtrans serta mendapat notifikasi rincian pembayaran via *email*	Sistem akan memproses transaksi pembayaran UPS mahasiswa menggunakan *Payment Gateway* Midtrans	Sesuai harapan
6	Melakukan input data atas pembayaran yang sudah dilakukan pada Menu Verifikasi Pembayaran	Sistem akan menyimpan inputan data yang dilakukan oleh mahasiswa yang bersangkutan	Sesuai harapan
7	Melakukan *upload* atau melampirkan foto bukti pembayaran	Sistem akan menyimpan unggahan foto bukti pembayaran mahasiswa	Sesuai harapan
8	Keluar atau logout akun dari aplikasi	Jika mahasiswa ingin melakukan logout akun dari aplikasi, sistem akan kembali mengharuskan mahasiswa melakukan login	Sesuai harapan

Table 2
Black Box Testing Results on the Admin Side

No.	Skenario Pengujian	Hasil yang diharapkan	Hasil Pengamatan
1	Input Username dan Password pada Menu Login Admin	Sistem akan melakukan validasi akun jika benar maka akan menampilkan halaman utama (Dashboard)	Sesuai harapan
2	Registrasi pembuatan akun baru untuk Admin pada Menu Register	Sistem akan menyimpan data akun baru untuk Admin sesuai inputan yang ada ke *server*	Sesuai harapan
3	Menampilkan keseluruhan data akun E-UPS mahasiswa	Sistem akan menampilkan data akun E-UPS mahasiswa yang sudah tersimpan dan dapat melakukan filter sesuai dengan jurusan dan keyword tertentu	Sesuai harapan
4	Membuat laporan data akun E-UPS mahasiswa	Sistem akan membuat laporan data akun E-UPS mahasiswa dalam format .pdf	Sesuai harapan
5	*Update* data akun E-UPS mahasiswa	Sistem akan melakukan *update* dan menyimpan informasi terbaru atas data akun E-UPS mahasiswa	Sesuai harapan
6	Melihat keseluruhan data yang telah diinputkan mahasiswa melalui Menu Verifikasi Pembayaran pada aplikasi android	Sistem akan menampilkan data inputan verifikasi pembayaran mahasiswa secara menyeluruh disertai dengan filter sesuai jurusan dan keyword tertentu	Sesuai harapan
7	Melihat lampiran foto bukti pembayaran yang telah diunggah oleh mahasiswa	Sistem akan menampilkan lampiran foto bukti pembayaran yang telah diunggah	Sesuai harapan
8	Melakukan verifikasi pembayaran mahasiswa	Sistem akan menampilkan data pembayaran mahasiswa dan menyimpan hasil verifikasi	Sesuai harapan
9	Mengirimkan pesan via *email*	Jika data pembayaran pada Menu Verifikasi Pembayaran sudah diverifikasi oleh Admin, dan tertampil status menjadi "Sudah Diverifikasi" maka terdapat tombol "Send Email" untuk mengirimkan pesan via *email* untuk mahasiswa	Sesuai harapan
10	Membuat laporan pembayaran UPS mahasiswa	Sistem akan membuat laporan data pembayaran mahasiswa yang telah diverifikasi dalam format .pdf	Sesuai harapan

4.4.1 Black Box Testing Conclusions

From the results of system testing in Table 1 and Table 2 it can be concluded that the system design both in the admin and student side can work well according to their expectations and functions.

5. Conclusion

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Based on the research that has been done, it can be concluded that the design of UPS payment applications using Payment Gateway and online payment verification can be beneficial for students and the BAK (Financial Administration Section). On the mobile application side students can make payments according to UPS costs based on their majors namely Information Systems. With the application design that has been made, students in verifying payment do not need to come directly to the BAK to provide proof of payment. Simply using each smartphone can make the verification process more effective and efficient. As for the BAK admin,

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