Mobile Application Reminder of SPP Payment Schedule's and School Activities Information Based SMS Gateway

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Abstract—**The purpose of this research is to build information facilities of SPP Payment Schedule and Dissemination of Information Activities at Alfaduta Dumai kindergarten. This application is able to handle the payment process and convey information activities more efficiently using the information technology. This application will help to disseminate the information quickly and reduce the lateness of payment information by using SMS facility (Short Message Service) Gateway to parents/guardians. This application uses SMS Gateway that can disseminate the message to users automatically and quickly. It is directly connected to the database of mobile phone numbers and the operator does not have to type in hundreds of numbers and messages on the mobile phone, as all the numbers will be taken automatically from the database. This mechanism allows all kinds of announcements to be sent via SMS using Mobile Application Reminder Payment Schedule SPP and School Activities Information. The SMS Gateway will be able to facilitate the administrator and the school to provide various information to parents or guardians, and overcome the lateness of SPP payment every month.**

Index Terms—**Mobile Application; System Information; Payment Schedule and SMS Gateway.**

I. INTRODUCTION

The increase in the development of advanced technology requires schools using manual systems to switch to computerized systems. For example, communication between parents/guardians with Administration/TU to convey information of school activities and notification of arrears of payment SPP (Contribution of Education Implementation) at TK Alfaduta that is still done manually using leaflets pose problems to parents/guardians. Specifically, parents/guardians tend to miss or forgot the school's notification that is manually given to children as the leaflets are left in the child's bag without the parent/guardian knowledge.

Based on these conditions, it is necessary to build an information system of arrears of SPP payment and information dissemination of school activities, which can handle the process of delivering information from the school to parents. It is anticipated that this system will be able to properly and efficiently manage the dissemination of information. In particular, the delivery of information from the school to the parents is facilitated by SMS facilities (Short Message Service) with text through mobile devices (Mobile Divice). The system also comes with Auto Replay facility.

Mobile devices as a small form of computer can be used to change people's behaviors [1] in such that people tend to spend more time with their mobile phone than other people.

In 2013, 91% of the American people own at least one phone call and 60% of them use their cell phone to access the internet while 49% of their activities are getting directions, recommendations, or getting other location-based information [2]. In particular, research activities on mobile commerce have been significantly increased since 2000, thus they are considered as popular and mature discipline. The capabilities of user infrastructure, faster processing times, large storage capacity, and corresponding mobile interfaces need to be considered [3].

Mobile apps can be defined as a product of a mobile computing system, a computing system that can easily be physically moved and can be used while they are being moved. Examples are personal digital assistants (PDAS), Smartphones and mobile phones [4]. Based on the type, [5] divided mobile apps into groups, one of which is Short Message Service (SMS). It is the simplest mobile app, designed to be messy and useful when integrated with other types of mobile apps.

SMS is still widely used as a broadcast medium because of its increasingly cheap price. SMS as a medium of communication has been popular and its use has been utilized for various applications, such as kWh-meter recording, data collection of electric power, and long distance vehicle alarm [6]. Although SMS seems simple because it is only based on the text, it turns out to have various benefits that can provide convenience and assistance to a variety of human jobs. SMS technology on mobile phones can be combined with an application that utilizes the database so that data sent from SMS can be recorded in the system and processed, and the results are displayed as a more useful information. The database is used as a data storage representation that is represented in tables and records. The database is a collection of related data that showed and designed to minimize repetition as well as reduce data conversion [7].

Operations in the database are performed more easily through the database management system. The database management system is a software designed to perform tasks more easily. By storing data in the database management system and comparing them to a set of operating system files, we can use the features of the database management system to manage the data reliably and efficiently [8]. This research refers to several scientific journals that address similar issues and subsequently made the literature review. The first journal entitled "Designing Information System Donations of Vocational Middle School Education of 3 Jepara with SMS Gateway" [9] explained that with the SMS Gateway, the school can send information payment donation of education

to the guardians. The services provided are to facilitate the implementation of payment activities as well as to deliver information to students and parents.

The next journal entitled "SMS Gateway Application Design for Library Card Creation at Faculty of Engineering Unsrat" [10] created a system for making library cards. With the application of SMS Gateway application program, students only complete the biodata to create a library card via SMS Gateway.

Another journal of other reference with the title "Based on SMS Gateway Based Gateway Information System Using Prototype Method At State Senior High School 1 Bergas" [11] focus on academic information system designed based on SMS Gateway to help the parents and the school in monitoring the development of students. The result of the research is the creation of an academic information system based on SMS Gateway at SMA N 1 Bergas using Prototype Method.

SMS Gateway is a technology of sending, receiving and even processing sms through computer and computerized system (software). As we know, today, almost all individuals already have mobile phones (mobile phones), SMS is one feature on the phone that must be used by the user (user), either to send or to receive sms. In terms of SMS speed, more and more terminal (handphone/modem) connected to the computer and to SMS software, the faster the process of sending the SMS[12]. Figure 1 shows the SMS Gateway Scheme.
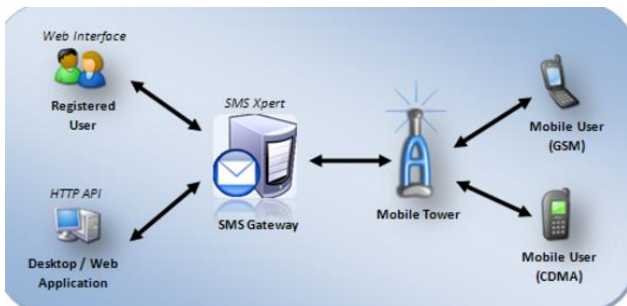

Figure 1: Scheme SMS Gateway

One of the advantages of SMS is the low cost. In addition SMS is a Store and Forward Method so that the benefits obtained are when the recipient's mobile phone can not be reached, in the sense of inactivity or outside the service area, the recipient can still receive SMS when the mobile phone is active again [13]. The description of SMS sending mechanism can be seen in Figure 2.
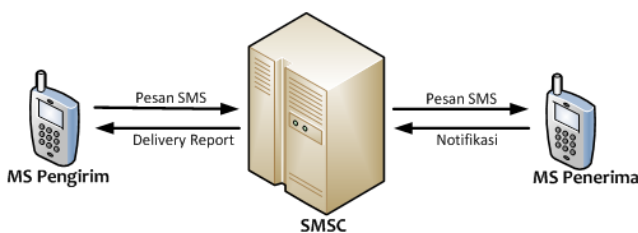

Figure 2: The mechanism of how SMS works

SMS Gateway is a gateway for information dissemination using SMS. You can quickly and easily distribute messages to multiple numbers that are directly connected to the database of mobile phone numbers only, without having to type in hundreds of numbers and messages on your mobile phone, as all numbers will be taken automatically from the database, with SMS Gateway. You can manage the messages you want to send. Using additional self-generated programs, messaging can be more flexible in sending news, as usually the messages that are sent are different for each recipient [14].

The workings or flow of incoming SMS Gateway are:
i.   Customer / Mobile Station (MS) sends the message.
ii. SMS goes to SMSC via Mobile network.
iii. From SMSC, messages is transferred to Content Provider through SMSGateway.
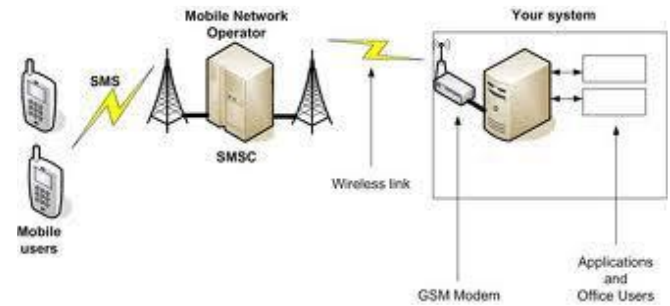iv. Incoming messages to Content Provider is processed by application, in which the response is sent to MS.

Figure 3: How to work SMS gateway

II. LITERATURE REVIEW

A. Features SMS Gateway

There are some common features developed in the SMS Gateway Application, which are:

1) Auto-reply
SMS Gateway will automatically reply to incoming SMS. For example, for the purpose of requesting certain information (eg currency exchange rate, travel itinerary), where the sender sends an SMS with a certain format that the application recognizes, then the application can auto-reply by replying to the SMS containing the required information.

2) Bulk Shipping
It is also referred to as SMS Broadcast. It aims to send SMS to many destinations at once for example, for the latest product information to customers.

3) Scheduled Delivery
An SMS can be set to be sent to the destination automatically at any given time. One of the things that plays an important role in sending SMS is the SMSC (Short Message Service Center), which is a mobile phone network that handles the sending of SMS. When someone sends an SMS message via mobile phone, SMSC assigned to send the message to that destination number is removed from the SMSC storage [15].

B. Software

Software is electronic data stored in such a way by the computer itself. The stored data can be either a program or an instruction to be executed by a command as well as records that the computer needs to run the command [16]. In this research, the software used in this study are:

1) PHP (Page Hypertext Prepocessor)
PHP programming language (Page Hypertext Preprocessor) is a programming language that works

in a Web Server. The PHP scripts are created stored on a server and executed or processed on the server. By using PHP program, a website will be more interactive and dynamic [17].

2) *MySQL.*
Flexible data storage and fast access is needed in an interactive and dynamic website. Database itself serves as a container of data that you input through the website form. This type of database is very popular and is used on many websites on the internet as a data bank is MySQL. MySQL uses SQL and is free, besides MySQL can run on various platforms, including Linux, Windows and so on [17].

3) *XAMPP*
XAMPP is a software provided in geratis, which supports many operating systems, is a compilation of several programs. To perform its function as a stand-alone server, which consists of Apache HTTP Server program, MySQL database, and language translator written in programming language PHP and Perl. XAMPP is a name that stands for X (four operating systems of any kind), Apache, MySQL, PHP and Perl. The program is available in GNU "General Public License" and is a free, easy-to-use web server capable of serving dynamic pages [17].

4) *Adobe Dreamweaver*
Adobe Dreamweaver is an application software that is used as a professional HTML editor for web designing visually. This application is also commonly known as WYSIWYG (What You See Is What You Get), which in essence is that users do not have to deal with HTML tags to create a site. In addition, Dreamweaver also provides flexibility for users to use it as a medium of writing web programming language [17].

5) *Browser*
Browser is an application program that translates HTML code and represents web pages. This application is the most commonly used for browsing in the virtual world. It is a software that serves to display and interact with documents provided by the web server. Web browser is the most commonly used intermediary type of user. It is a collection of networks containing documents and connected to each other, known as WWW (World Wide Web) [19].

6) *Gammu.*
Gammu is a service provided to build SMS-based gateway applications. In addition to easy, SMS gateway application with gammu is free. There are two working mechanisms of the gammu that is as application and as deamon. Gammu as an application will work when your gammu commands are executed on the shell and its commands are included according to the desired function. While your gammu as deamon, your gammu is marked by executing smsd command on the shell. In principle how the gammu work is connecting the modem / phone with PC. SMS received on the modem / mobile will be taken by gammu to be moved into a pre-arranged database [20]. The way the gammu works can be seen in Figure 4.
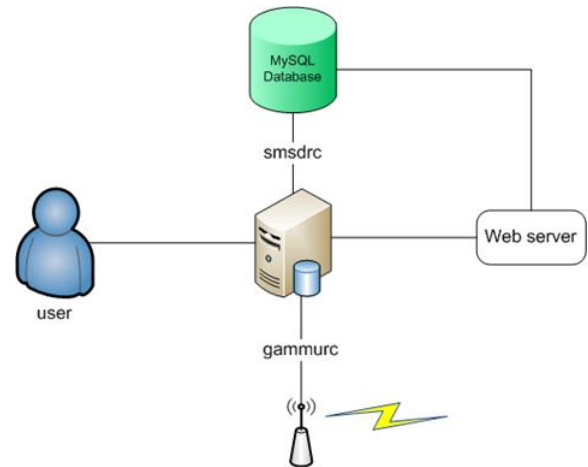

Figure 4: How to work Gammu

III. METHODOLOGY

This application is designed and manufactured in accordance with the method of software design. System Development Life Cycle (SDLC), starting from the system analysis stage, followed by system design, system implementation, and lastly, system maintenance, which has several stages from the start of the system is planned until the system is implemented, operated and maintained. In cases where problems that are critical and can not be overcome exist in the system operation has been developed, it is necessary to rebuild a system to overcome it. The development process has to start from the first stage, that is the planning stage of the system [21]. Figure 5 shows the main stages of system development life cycle.
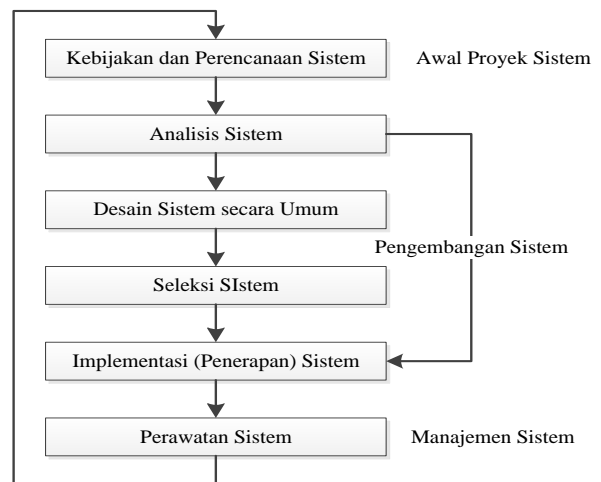

Figure 5: System development life cycle

The main stages of system development life cycle are:
1) *Systems planning*
System planning stage (system planning) is an early stage in the system development. At this stage, the researchers first determined the objects to be researched, then determined the place and time when the research is to be carried out. After identifying the object to be studied, the researchers collected the data related to the object of research, such as looking for

references and studying books and literature related to this research.

2) *Systems analysis*
   The second stage is the analysis system (system analysis). The discussion of the problems that exist in the system has been described in the formulation of the problem.

3) *Systems design*
   At this stage, Mobile App Designing Reminder Schedule SPP Payment as well as School Activity Information with SMS Gateway were designed in accordance with the information that has been obtained from the data collection. Researchers determined the appearance of applications, databases, programming languages and inputs used in the application so as to produce the expected output. Applications were designed globally using Information System Flow (ASI), ContextDiagram, Data Flow Diagrams (DFD) and Entity Relationship Diagrams (ERD). Then in detail, the design was carried out by forming the data file design, input, output and flowchart.

4) *Systems selection*
   The result of the system design is the system on paper. To implement the design, the physical system components need to be equipped. The physical components of this system is a component of technology that can be either hardware or software. Due to the many alternative technologies available as well as the providers, it is necessary to do the selection. Selecting the technology for information systems is also not easy. The system selection phase is a stage to select the hardware and software to support information systems to be developed later.

5) *Systems Implementation*
   The system that has been selected was then implemented to the users. At this stage, there are several activities performed, such as program testing, software and hardware installations, training to system users and others.

6) *Systems Maintenance*
   The final stage of system development life cycle is system maintenance. Once the system is implemented, the system goes through the maintenance phase to ensure that the system works when it is used.

Figure 6 shows the overview of this system built by the researchers.

IV. IMPLEMENTATION AND TESTING

Several tests were conducted to evaluate whether the system built meet its objectives. Tests conducted on Input and Output design.
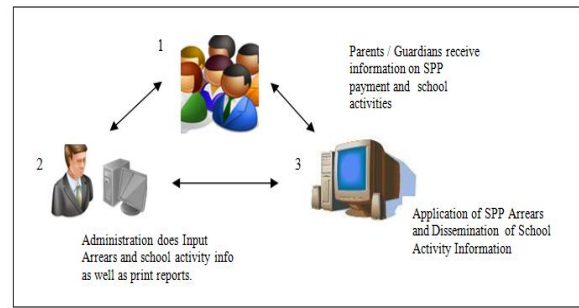

Figure 6: System overview

A. *Design Input*

The design of the input describes the beginning of the process of data processing to become information where the required data is included in the reporting process. Before starting the Mobile Aplication Reminder of SPP Payment Schedule as well as School Activity Information with SMS Gateway, the admin first login to the system. The design Login view SPP Payment Application And Information Dissemination Activity with SMS Gateway At Alfaduta Dumai kindergarten is shown in Figure 7.
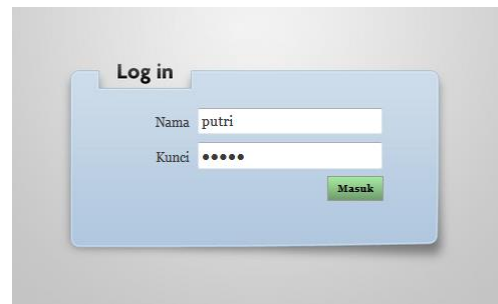

Figure-7: Login view

Figure 8 shows the display if user log in to the system successfully. Once the use successfully log in to the system, the user will enter into the start menu. Here, the user can select multiple input menu options such as add student data , add group, Add Phonebook, SMS configuration, and send Information and check facility. This master menu can be seen in Figure 8.
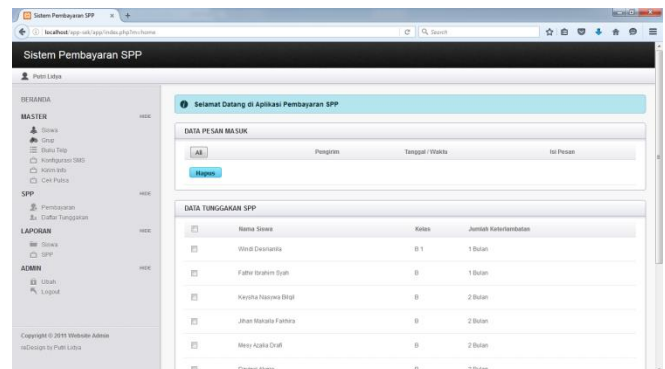

Figure 8: Display data incoming messages and arrears list on the main menu display

B. *Design Output*

The output design is the output or the desired result, which is also a means of communication or liaison between users with the computer systems. The form of output is the display

or output of the activities performed. Figure 9 shows the form of output designed in Mobile Applications Reminder Schedule of SPP Payment and School Activity Information by using SMS Gateway At Alfaduta Dumai TK using additional auto reply feature. The output design view SMS function to display the results of SMS sent by System to HP Parent / Guardian Students are: Figure 9(a) is SMS output menu design Notice that SPP Payment can be executed. Draft Menu Output SMS Notice of Delay Payment of SPP can be seen in Figure 9(b), Draft Menu SMS Info Billing input, in which the system can provide output in the form of information on the number of invoices can be seen in Figure 9(c).
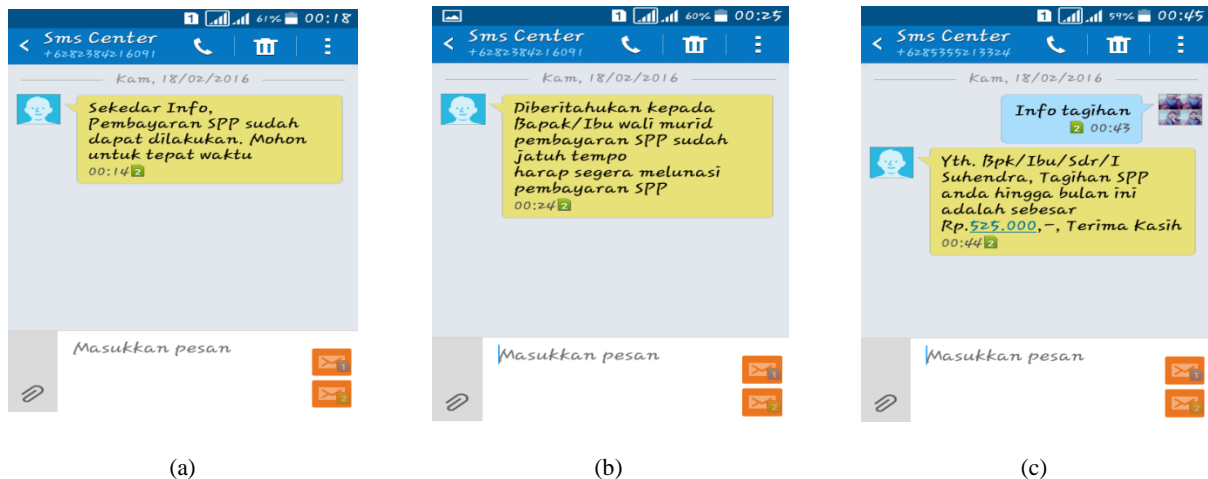

(a)   (b)   (c)

Figure 9: Design output

V. CONCLUSION

The conclusions that can be drawn based on the results of research and system testing are as follows:

i. Mobile App Reminder of SPP Payment Schedule and School Activity Information Based on SMS Gateway is designed to facilitate the school in delivering SPP Payment Schedule information and other information related to school activity to parents.

ii. Mobile applications is designed to facilitate the dissemination of information submitted to parents to be more real time so that there is no reason for parents to complain that they did not received the information; hence it can overcome the constraints and weaknesses caused by the old system.

iii. This system provides a platform to parents/guardians on using SMS Gateway that sends SMS in the form of information late payment of SPP and activity information automatically.

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