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DESIGNING PARKING SYSTEM-BASED VB.NET AND MYSQL USING RADIO FREQUENCY AND IDENTIFICATION (RFID)

Adi Fajaryanto Cobantoro^{1✉}, Fery Grahanda Anugra¹

¹Department of Informatics Engineering, Faculty of Engineering
Universitas Muhammadiyah Ponorogo, Ponorogo 63471, Indonesia

✉Corresponding author e-mail: adifajaryanto@umpo.ac.id

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Abstract

Parking system has become a significant need for a university. A good parking system is useful to ensure the user's vehicle safety. The current parking system applied in Universitas Muhammadiyah Ponorogo is still manual. Instruments of the study are observation, interview, and software development method used is waterfall method. This study has designed a parking application using RFID technology that can show users to empty parking locations so that customers can find vacant parking locations quickly and reduce queuing processes. The identification process is done when a customer enters the parking lot. Media used is in the form of RFID card. With parking applications using Radio Frequency and Identification (RFID), it changes the manual parking system into a more effective and efficient parking system.

Keywords: application, parking, Radio Frequency and Identification (RFID)

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INTRODUCTION

Parking is one of facilities that should be a well-served in an institution. This facility holds an important role for the sake of institution development. A well-parking system will make the customers safe. Therefore, they will do their activities conveniently.

Inconvenient parking system will lead to a problem. For instance, it happens in parking system located in the University of Muhammadiyah Ponorogo. The current parking system used in Muhammadiyah University Ponorogo is still manual. Vehicle parking system here still uses parking attendants to direct and control parked vehicles. It is surely inefficient. One of the problems is ineffective parking sys-

tem so there are often empty spaces that cannot be used as parking spaces and lack of information on vacant parking lots (Nataliana, Syamsu, & Giantara, 2014). This makes the parking area can not accommodate the vehicle maximally. As a result, many vehicles can not occupy the parking area.

Based on this problem, a systematic parking system is needed to overcome the problem. It takes a computerized system capable of directing parking users to vacant parking locations, so the authors have an idea to create a parking application system using Radio Frequency and Identification (RFID) technology. RFID technology is chosen because the process of card readings are fast and easy to use.

It is expected that with this parking application system parking users can park the vehicle at a designated location in accordance with available parking capacity.

The study, "Parking Management System Using Radio Frequency And Identification Technology (Case Study of Faculty of MIPA Mulawarman University)" concludes that parking management system by utilizing rfid technology provides fast and non-resilient resonance to make the system more efficient and economical than manual systems or systems with barcode code because rfid-uses radio waves as a medium of information exchange (Darwin, Kridalaksana, Khairina, 2014).

RFID (Radio Frequency and Identification)

RFID is a telecommunication-data device using radio waves to exchange data between-a reader with an electronic tag attached to a particular object. Data communication technology between an RFID reader and electronic tag (RFID tag) is contactless, real time and wireless (Nugraha, Yudistiro, Astuti, & Budiyanto, 2015).

The identification of data on RFID tags is performed through radio frequencies propagating through air at a certain range according to features owned by each RFID module (con-

sisting of RFID reader and RFID tag) used (Rachmat & Hutabarat, 2014).

RFID is the process of identifying a person or an object using the transmission frequency radio. RFID uses radio frequency for reading information from a small device called a tag or transponder (Transmitter + Responder). The RFID tag will recognize itself when it detects signals from a compatible device, ie an RFID reader (RFID Reader).

Radio Frequency And Identification (RFID) is a technology that uses radio waves to identify people or objects automatically by using tags or cards (Darwin, Kridalaksana, Khairina, 2014).

Microsoft Visual Basic .Net

Visual Basic.Net Programming is a tool to develop and build applications that move on the .net framework system, using the basic language (Nur & Sinatra, 2017).

MySQL Database

The database (database) is a collection of data that are connected each other. The database is stored in a race-to-race manner, and is manipulated using the software (Anisya & Wandyra, 2016).

Mysql is a rdms (relational database management system), and is widely applied to enterprise level (it can be used in high-end business equivalent to micro-softsql server, oracle, sybase, sap etc.) (Maulana, 2016).

Mysql is claimed as a reliable database so widely used by software developers (Cobantoro, 2016). Mysql requires storage space as needed.

METHOD

Waterfall method is utilized as the methodology for this designing software study.

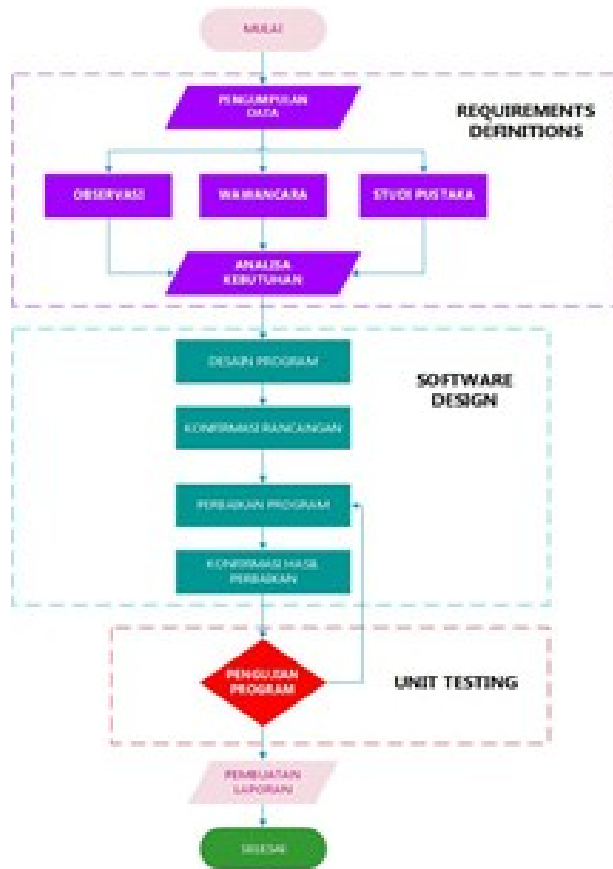


Figure 1. Waterfall Methodology

This method consists of several stages. Those are requirement, design, implementation, verification and maintenance (Shodiq, Satoto, & Kridalukmana, 2013). These stages are easy to implement and can be repeated over and over, small to medium-sized applications are easier to use this method.

RESULT AND DISCUSSION

Customers park the cars through the entrance gate by using RFID card. There is a RFID-based parking system in the entrance gate. Once customers are in front of the machine,

they need to put the RFID card closer to the machine. The data will be saved in the database, and automatically the system will direct the customers to the free or available space (Area A, B, or C). The same systematic is also performed for parking lot leaving. The customers have to put the RFID card in the reader machine that will automatically record the report of parking data. See figure 2.

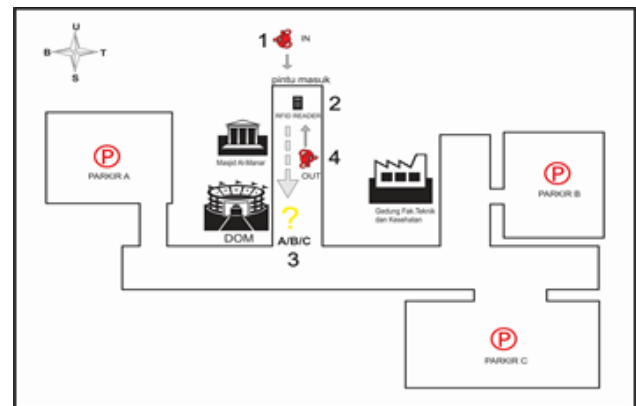


Figure 2. Map of Parking Lot

Flowchart System

Figure 3 shows the flowchart system of RFID-based parking system. It clearly depicts the brief explanation about the parking system, started from the entrance gate until the exit gate.

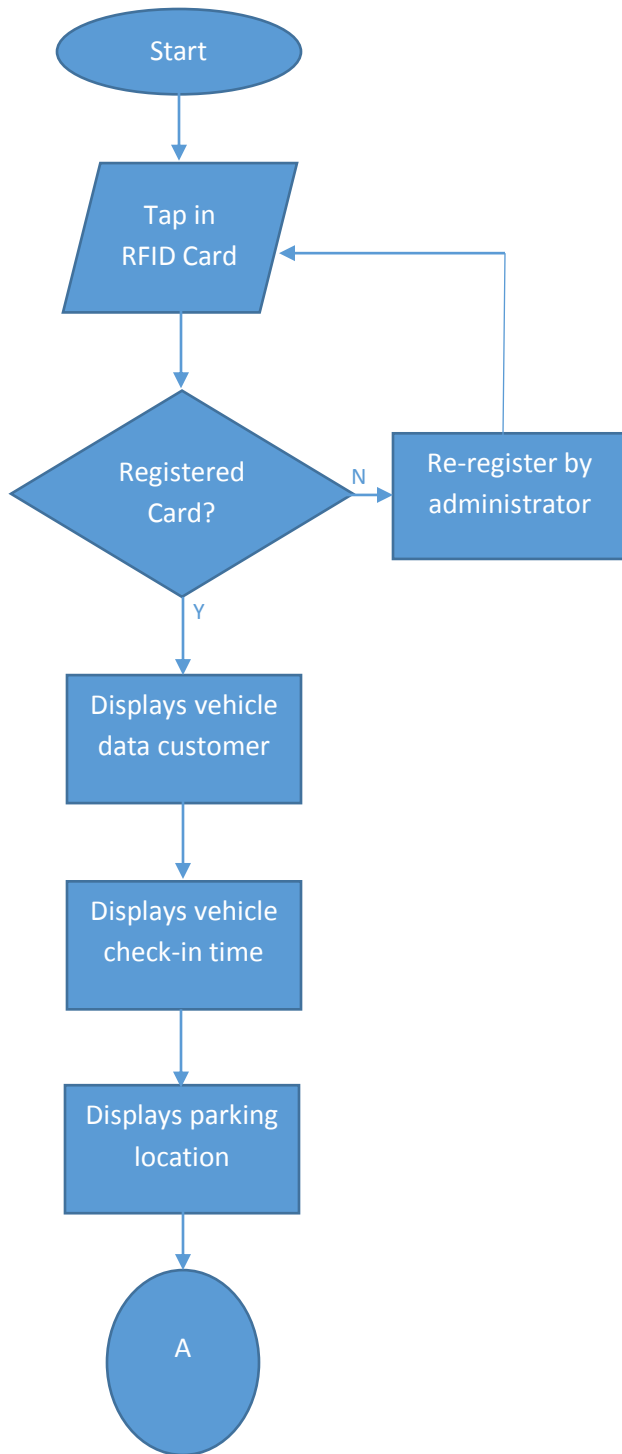


Figure 3. Flowchart of System 1

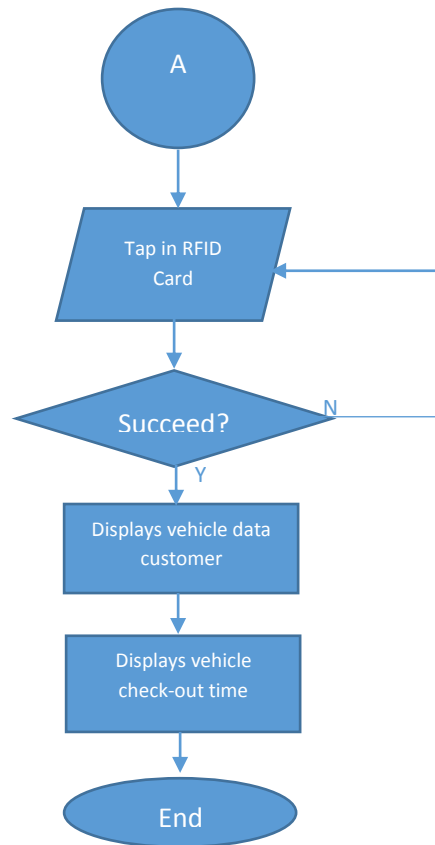


Figure 4. Flowchart of System 2

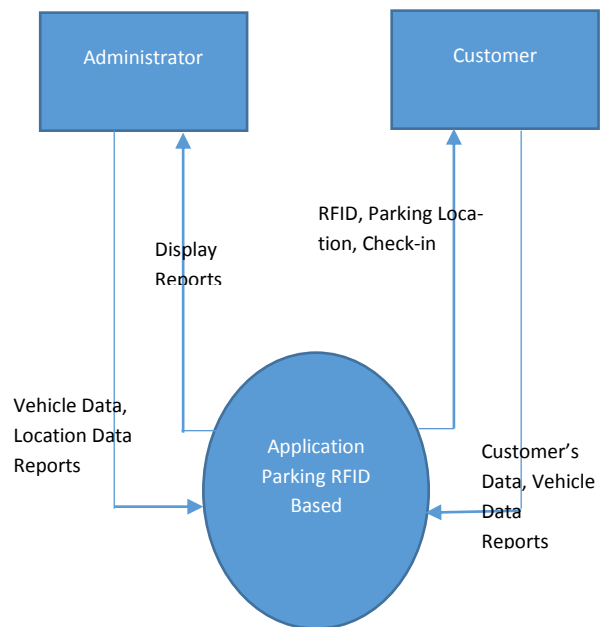


Figure 5. The DFD Parking System

DFD parking system displayed in figure 5 contains of two main entities, namely Admin and User. Admin is responsible for all data management of user and the process of user card registration. Meanwhile, user merely refers to the customer making use of the application with limited access.

Login form of the parking application system shown in figure 6 is made by applying system of multilevel user. In this case, there are two users with different access roles. The first role is to login as admin who has full access to the program. The second role is to login as the user who has limited access.

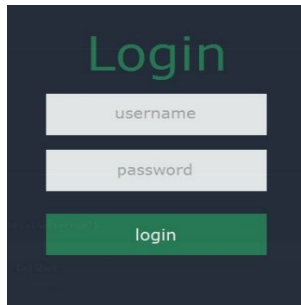


Figure 6. Login Form

The administrator, when accessing the system, will be logged in to the main form as displayed in Figure 7.

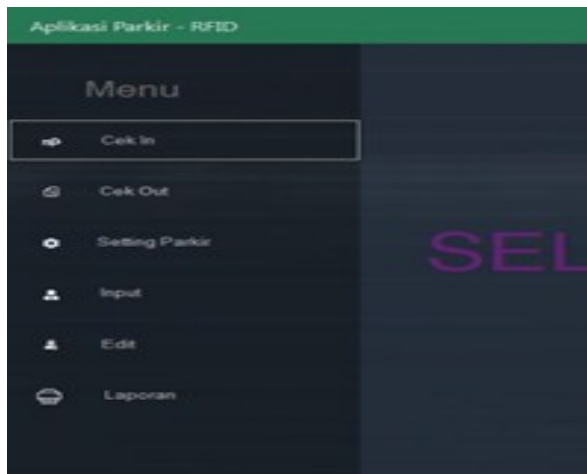


Figure 7. Display Form of Main Home

In the main menu of this application, there are several features that are available, namely check in, check out, settings, input and edit user, and reports. Each feature has its own function. For example, the check-in feature is used when a user wants to enter the parking lot, while the check out feature is used when the user exits from the parking lot.

Besides, administrator can also set the configuration of parking lot as shown in Figure 8.

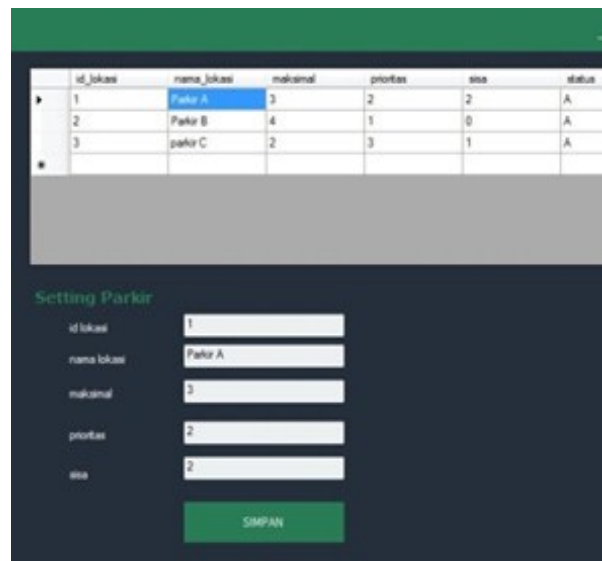


Figure 8. Menu of Parking Lot Configuration

The Edit User Menu in the administrator account can be used to make changes to the user's personal data as well as the owned vehicle data as shown in the Figure 9.

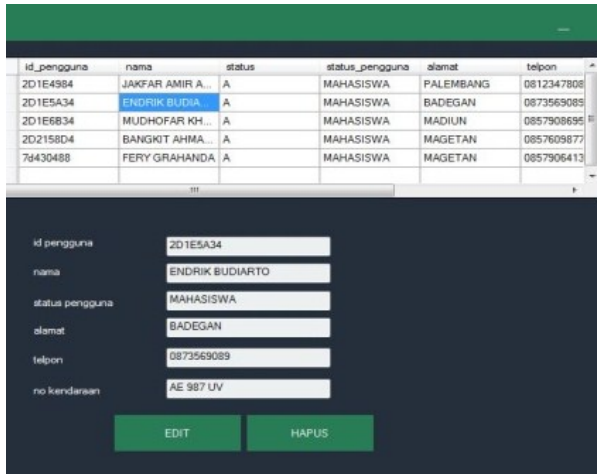


Figure 9. Menu of Edit User

Program Results Test

In this stage of research, the researcher tested the results of the system that has been implemented. Trials were conducted by using five RFID tags that have been registered in the database of parking system. Several trial programs have been conducted with a variety of different parking priority settings.

First Test

In the first test, the parking setting is made as what is displayed in table 1:

Table 1. Parking Setting Test I

Id Loca- tion	Location	Maxi- mum	Prio- rity	Re- main
1	Parking lot A	3	1	3
2	Parking lot B	4	2	2
3	Parking lot C	2	3	1

The test result of five RFID tags based on the above setting are:

Table 2. Result of Test I

No	No. RFID	User name	Parking location
1	2D1E4984	Jakfar Amir	Parking lot A
2	2D1E5A34	Endrik Budiarto	Parking lot A
3	2D1E6B34	Mudhofar Khoirul	Parking lot A
4	2D2158D4	Bangkit Ahmad	Parking lot B
5	7d430488	Fery Grahanda	Parking lot B

From the first test, it can be known that this RFID parking system is successful as it succeeded in locating the parking lot prioritized in the parking setting.

Table 3. Parking Setting Test II

Id loca- tion	Location	Maximum	Priority	Remain
1	Parkir A	3	3	3
2	Parkir B	4	1	2
3	Parkir C	2	2	1

Table 4. Test Result II

No	No.RFID	Name of User	Location
1	2D1E4984	Jakfar Amir	Parking lot B
2	2D1E5A34	Endrik Budiarto	Parking lot B
3	2D1E6B34	Mudhofar Khoirul	Parking lot C
4	2D2158D4	Bangkit Ahmad	Parking lot A
5	7d430488	Fery Grahanda	Parking lot A

In the parking setting displayed in table 3, it is known that the first priority is parking lotB, the second priority parking lot C, and the third priority is parking lot A.

From the result of both tests, it can be said that this RFID parking system is successful as it is succeeded in locating the parking lot

prioritized in the parking setting with 100% accuracy of range.

CONCLUSION

The design of VB.Net and Myql-based parking application by using RFID technology can be used as a means of parking location identification within the parking lot in term of entering and exiting the parking area. The parking location identification process is done at the time of parking entry. The application will check within its database system which location of parking is available. The process of locating the parking space is based on the priority scale of available parking area. Thus, the queue of cars can be minimized

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