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Online Classroom Attendance System Based on Cloud Computing

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Keywords: Classroom Attendance, RFID Reader, Cloud Computing, Database

Abstract: Attendance of students in the classroom is one of mark representation of total marking after finish the end of class, some of the students are cheating they are attendance while manual system by sign in the form of attendance. Furthermore, manual attendance is ineffective way while digital technology is available and widely used nowadays and waste of papers. This research discusses on automatic attendance system for students and lecturers, where every student before entering classroom have to tap their student card on RFID reader and before out need to tap as well. Duration of time set as tolerance of lately as well as for early out of the classroom. Similar to students, every lecture required to tap as well before and after teaching in a classroom, besides that lecturer required to hold his card on RFID reader to on electricity in the classroom else no electricity and no power in the classroom. The data of students and lecturer attendance with room number is set and send to a database for student's attendance and honorarium for lecturer. This system tested in a classroom of Faculty of Engineering, Islamic University of Riau with the number of students 40 people. Data collected by RFID reader passed to the cloud server which controls by University information technology and connects to the payroll system in the finance department. The system gives effective and efficiency in administration, while no more manual record as well as clerk, do not need to summary lecturer attendance at the end of the month for an honorarium. Paperless and efficiency for staff to control and manual attendance is one of the advantages of this system, and also students and lecturer unable to cheat their attendance in double class teaching at the same time.

1 INTRODUCTION

Classroom teaching is a common method that currently applying by most the academic institution including in school and colleges. The conventional method by having manually signed the attendance in a sheet of paper then passed around the classroom while lecturer conducts the teaching in the classroom is wide implements nowadays. This method could undoubtedly allow the students to do cheating about their attendance in the classroom, where a student may sign for an absent student. In addition, the help form can easily be lost or lost during circulation. A more rigorous approach, especially to prevent students from cheating on their attendance, is also boring, where a teacher tells each student's name based on a list of student names and validates each student's attendance. It has been proven that the form of a manual method for bringing student attendance is difficult and time-consuming to verify each student. Without control, whether confirmed students respond or not, consolidated attendance calculations are another important task that can cause manual errors. In some other cases, attendance sheets may be lost or stolen by some students. The consequence of such a problem with attendance notes on paper has made it stressful and ineffective, especially in large classes. As a result, there is a need to find new and modern ways to track and manage student attendance records at higher academic learning institutions more efficiently and effectively.

Therefore, it is very important to develop an assistance system that is equipped with an online database, especially to prevent data loss, as well as to promote ecological and paperless and ecological technology campaigns. In addition, this application will help reduce time wasted, which will lead to greater learning productivity in the classroom. Several paperless assistance systems have been developed, but they must be equipped with a computer or RFID reader, which incurs additional costs for hardware and can result in maintenance. With that in mind, our goal is to overcome this problem by having a system with minimum hardware requirements and, at the same time, enhancing the mobility aspects of the existing support system.

Furthermore, to overcome such troubles as mention in the above discussion, the required of automated attendance system is required for system management. Many way and technique are available as the basic concept of the system. In this system proposed an automatic student and staff (lecturer) attendance system, where RFID reader installed in every classroom and assign with an identity for identification of what classroom used.

2 RELATED WORKS

This section discussed on several works have been done on previous research conducted. Some of previous works review related systems and student different for the methods in record student's attendance. The use of android based system for students attendance as discussed in (Noor et al., 2015) where the application installed then can be download the students list from a designated web server. Refer to students attend in the classroom after their scan the card to Radio Frequency Identification (RFID) reader (Evizal et al., 2012). Additional of device such as cameras used to support the system information and student's attendance confirmation. Another research discussed on this attendance system which elaborate in (Varadharajan et al., 2016) describe the students attendance without human interference. The used of camera as a method to fix in the classroom and will capture the image when every student going into room, the faces of students are detected and then recognized and match to the database and finally the attendance of student is marked. If the attendance is marked as absent the message about the student's absent is send to their parents.

The others research is developed student attendance system used a fraction of the classroom for participation points and lead the students' attendance list into a preset teaching system such as attendance by checking every student, random questioning based on the list, and quiz. Similar to the ladder ranking system that widely used in current online computer games, students can check their ranking of accumulated absence and points in the end of class as a long term stimulus for study. (Debiec, 2017; Gunawan and Kadir, 2017; Xiao et al., 2018).

The traditional student attendance system required physically sign the attendance sheet every time conduct lecture in the classroom. This method is unnecessarily time consuming to notice and mark student's name on the attendance sheet. This is happening that some students may accidentally mark the others student name or willingly to do it. Normally, the hard copy of attendance sheet after a few weeks may get lost or easily get messy. Used of smartphone such android technology will help teacher to get student attendance easily by online system then be able to check percentage student attend the class as well to copy or print it. By using the stored information, teacher easily to mark student attendance, attendance percentage calculations, marking intruders' entry, send emails or send message to the parent to keep them updated about their child's attendance at the school or college (Islam et al., 2017; Tarimo and Hickey, 2016).

Online Biometric-enabled Class Attendance Register System (OBCARS) prototype elaborate by (Wei et al., 2017) develop and design to change of misplaced and torn attendance register form in various classroom in school or college. System used biometric fingerprint reader for every student before entry the classroom. While the (Wei et al., 2017) discuss on student attendance system used Near Field Communication (NFC) system. The solution be able to provides a traditional and mobile learning system for classroom to the school or college and university to enhance the interaction in the process of learning between the students and reduce the number workload given to the lecturers in summary of the attendance while in the clasroom (Kadir et al., 2016) All over previous research used normal online system then in this research proposed a new method of online system for student and lecturer pairing to make sure lecturer attend in the classroom as well. Beside that the use of cloud computing is one of additional feature in this system to make sure data of student's attendee can be access staff in everywhere. Student attendance information is very important is not only for classroom marking but for finance department to pay lecturer honorarium.

3 PROPOSED SYSTEM OF STUDENT ATTENDANCE

The proposed solution for online student attendance system uses several components and integration to become a system that is able to manage student's attendance. Difference to the current system that developed by other researchers, in this cloud computing has been used for data management system beside local server in an academic institution. Figure 1 shows diagram of the student's attendance system, where Arduino and RFID reader is the main unit for this system to control student and staff attendance.

Student and staff card occupied with RFID chip

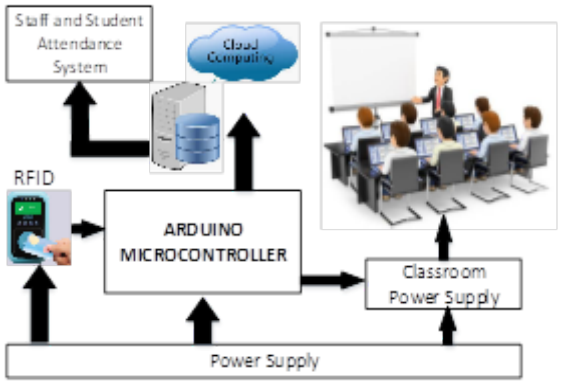

Figure 1: NumberBlock diagram of student attendance system.

which is Mifare 13.56 MHz and memory 1kB thus in this case users of the RFID reader to retrieve student or staff information by using an RFID system. Information stored in student card is limited, only the identity (ID) data stored with some information, this system designed to retrieve student ID information which is 9 characters same as to student matric number, as well as for the staff ID with 9 characters. Once ID of student or staff received by RFID reader then the information received in Arduino Microcontroller to compare to student or staff ID in database, this case student information linked to student academic management system, where every student as they are accountable for academic purpose, since the data and information available then attendance system only connected to the database without to set up a new database management system. Similar to student database, information of student classroom and schedule linked to the academic management system which every faculty have to manage lecture classroom, schedule, subject, time, and student registration the subject.

Figure 2 shows a flowchart of the attendance system that flows of the process in the system. All the information start from student scanning the card then system decide whether valid or information to process or not then make the decision of student attendance.

3.1 RFID

Radio Frequency Identification (RFID) is a technology based on wireless communication and Non-Line of Sight (NLOS) to retrieve information. Radio wave concept in RFID is able to collect information from the transponder (tag) to RFID reader, with advantages of this technology and more convenience for student attendance system thus apply in this system. Figure 3 shows a sample of student ID

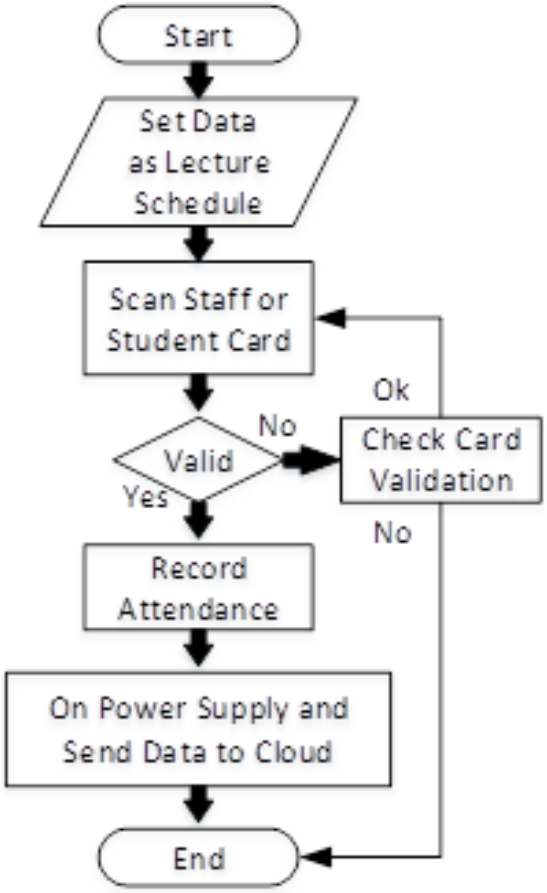

Figure 2: Flowchart of the student attendance system to process the information.

card used in this system with an emended RFID chip.

Figure 3: Sample of student ID card.

Similar to the student ID card, every lecturer and staff occupied with RFID chip in ID card as well, thus the process of data retrieve same as to student ID card. Figure 4 shows a sample of lecturer and staff ID card with an embedded RFID chip.

Figure 4: Sample of Lecturer and staff ID card.

3.2 Arduino

Arduino is a project based on an open source system that easy to use by the developer, hardware and software integrated system developed in a package. Currently, the Arduino module widely used in many application, thus in this attendance system used Arduino for microcontroller system. Figure 5 shows a picture of the Arduino module connected to an RFID reader to read and retrieve card information. All the information analysis and to be matched to the database as well as class schedule and verification then final information stored in the database. In order to be accessed by any party that required this information thus a cloud database setup to keep all the information.

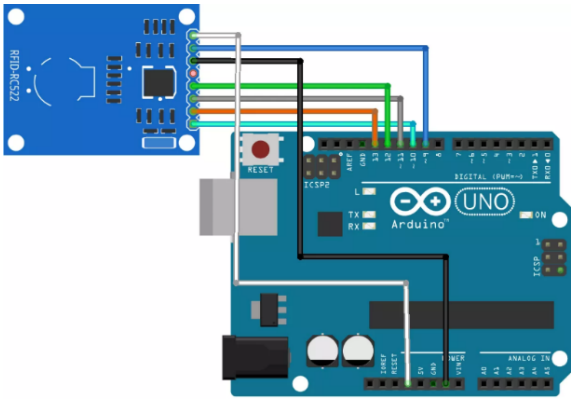

Figure 5: An Arduino module with RFID reader.

3.3 Cloud Computing

Cloud computing is a technology in computer science recently become an alternative to change from the local server to the cloud. The demand for availability system resources in a computer and especially for the storage of data and computing for power system without direct to a local server that manages by the user. The term cloud computing is in general used to describe data centres available to many users over internet access. Figure 6 shows a configuration of a cloud computing to be accessed by any user and the management system.

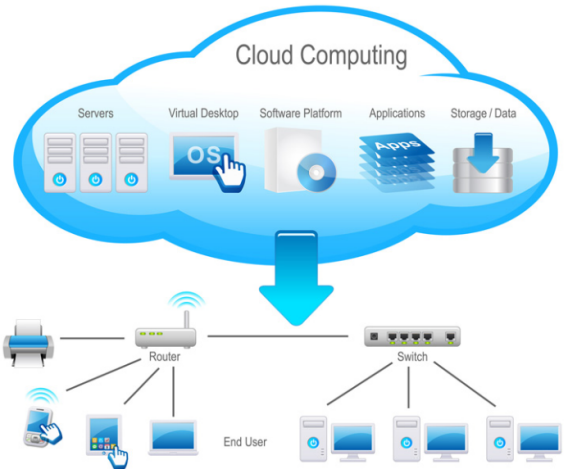

Figure 6: Configuration of cloud computing.

4 RESULTS AND DISCUSSION

Application of student attendance system has been developed and tested in the real classroom, some class of lecture tested with this system. Figure 7 shows a screenshot of student and lecturer attendance system in the classroom.

Figure 7: Application student attendance system.

In this case, an average of students in a classroom

is 30 to 40 students, in the previous student used manual sheet form that must sign to proof attendance in a lecture class, with this application student just wipe the ID card to RFID reader installed in front of a classroom. Once student wipes the card, if the status of the student is matched to class schedule and classroom then the information recorded and send to the data center, in this case, cloud computing used to store all the information. Maximum tolerance for the late in the classroom is 15 minute, so after late duration student consider absence although they wipe the ID card then no record keeps in the database. Similar to late toleration duration, the student must wipe ID card to RFID reader before the class finish to record the attendance, in this case, the duration is 15 before time schedule and 10 minutes after the schedule that every student must wipe the card else no out class recorded and student consider attendance not complete. Figure 8 shows a system for management before class start have to set by the officer.

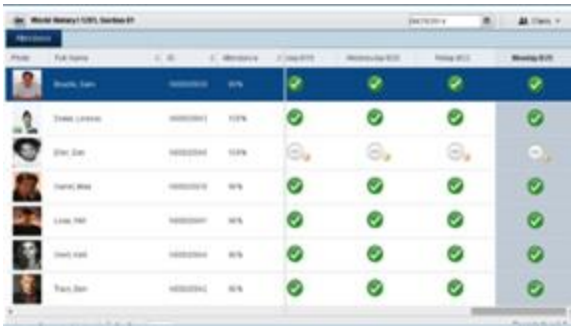

Figure 8: Attendance schedule system.

A report of student attendance system generated once lecture class finished, the report shows for every student in a classroom that attends the subject conducted by the lecturer. The report also recorded attendance for all the weeks, in this case, 16 weeks to complete a subject in a semester. Figure 9 shows a report sheet generated by this system.

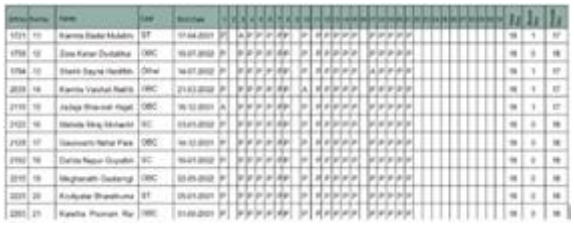

Figure 9: Student attendance report sheet.

All the information for every student and classroom including staff or lecturer conducted the lecture in classroom sent to the integrated database management system, the central database manages for a student account and payroll system for lecturer, this system assists in management to calculate hour of every lecturer in a month and amount to pay the honorarium. The information on student attendance record in cloud computing, then further development is to create a mobile system for the report to parent or guardian.

5 CONCLUSIONS

Student attendance system will benefit for an academic institution, instead of using a manual system that raises many issues and uncontrolled for student cheating. The system tested in several of lecture classroom, out of 38 students listed in the classroom where 36 students attend in the class and 2 students' absence recorded for the first testing, continue by 4 weeks. The system success to records all student and lecture attendance then record in a database. The system helps the officer and efficient system; management staff just verify the lecture in the classroom then confirmation before the final record. Cloud computing used as a database to make easy data retrieval from other parties.

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