

Bar Code Scanner Based Student Attendance System (SAS)

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Abstract— Student attendance play significant role in order to justify academic outcome of a student and school as overall. Unfortunately, there is no automated attendance record keeping application available in Malaysia's secondary schools. A preliminary study has been conducted in one of secondary schools in Selangor, Malaysia in order to understand the manual attendance record keeping process. Through interview session, Student Attendance System (SAS) development team, have identified that teachers and school management face problems in recording and managing attendance of their students. Therefore, SAS has been proposed and developed. Need for a tool to systematically keep the students attendance record increased due to increasing number of school students. Upon completion of SAS, user acceptance testing conducted among potential end users. Result of UAT shows most of the user satisfied with the system with some minor changes required.

Keywords— attendance recording, attendance reporting, bar code scanner

I. INTRODUCTION

Attendance record plays a significant role in the academic achievement of school students. Insufficient performance in school attendance leads to least performance in academic achievement [1]. A survey has been conducted in New York City public schools to study the role of school attendance as a mediator in relationship between student's grades in school test. At the end of the study, they found that attendance as the full mediator for grades in the school tests. By knowing these facts, attendance of a student should be given higher priority regardless of any schools categories. However, attendance keeping process becomes tedious due to increased number of students in schools now days. In Malaysia, the statistics by UNESCO shows in the year of 2006 the secondary school population enrolment is about 3201. Conventional way of taking attendance will be no more relevant to be used with this increasing amount of students. Moreover, unavailability of proper attendance tracking tools make the situation some more worst especially in Malaysia's secondary schools. Teachers have to spend lot of time in calculating the class attendance and to produce daily, weekly, monthly and yearly reports. Automated attendance record keeping tools needed by schools authority to keep track student's attendance and to generate all the report required. A study has been conducted in one of the secondary schools in Kuala Selangor district, Malaysia in order to understand the

manual way of attendance recording process. Based on the observation done, most of the teacher can't trace their students attendance effectively due to very tedious calculation process is needed in order to comply with the standard set by Malaysia Ministry of Education. Based on the study we have identified that each class teacher will be provided with attendance book. Refer to Fig 2 for a sample of secondary school attendance record sheet. Teacher call students name one by one and mark their attendance in the attendance sheet. Student's name needs to be filled up by teacher every month. Type of calculation/report that needs to be delivered by class teacher illustrated in the Fig 1.

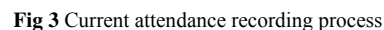
Fig 1 Attendance Reports

Attendance record is crucial and critical in determining the student academic performance [2]. This paper aim to discover the appropriate way to

student attendance. Easy connection of data into internet make RFID technology most common technology used in recording student attendance [4], [2], [5]. However, RFID technologies incur high cost and need experience people to handle the *system*. Apart from that, biometrics technology is another tremendous use of technology in the domain of attendance reporting and tracking. Most of the biometrics technology used thumb print as sign of *system* entry [6]. This allows a fair and reliable attendance to be recorded since there is no platform for any attendance cheating [7]. Biometric utilize the fingerprint apart from thumb print method. Fingerprint peripheral used to record the attendance and sent the data into *system* using wireless technology [8]. Image recording is another recent method used in recording attendance. Movement recorded in internal surveillance camera used as sign of attendance entry in one of the workplace in China [9]. These advanced technologies require high costing and well trained *system* developer. Use of bar code scanner is popular among educational institution which are not financially supported and it is not required any well trained people to install and fix [10]. Bar code scanner used as medium to record the attendance for one of the secondary school in Malaysia since their student card using bar code.

II. LITERATURE REVIEW-USE OF VARIOUS TECHNOLOGY IN RECORDING ATTENDANCE

Malaysia school consist of three type of education categories; primary education, secondary education and tertiary education. Student attendance has been recorded or tracked in manual way at most of the school in Malaysia. Investigation on student attendance recording process in Malaysian school has been conducted in one of the secondary school in Selangor state of Malaysia.



Refer to Fig 3 for the flowchart representation that depicts the current manual attendance recording process at the above mentioned school. Each class teacher provided with the class attendance book whereby it arranged in monthly basis. Fig 2 shows the sample attendance sheet from class attendance book. Since the attendance does not involve any *system* or application, calculation on student attendance and absenteeism remain tedious. Even there is a tendency of wrong calculation due to human error hence it effect the student performance at school. Apart from that, feasibility study has been conducted at the research area (Secondary school at Kuala Selangor district, Selangor state, Malaysia) to understand the need of developing and implementing attendance *system* in Malaysian schools. Interview outcome of the potential users of the *system* as shown in TABLE I

TABLE I
INTERVIEW OUTCOME

Potential Users	Outcome
Student	Student generally not satisfied with the current manual attendance tracking <i>system</i> because sometime they cannot hear when teacher call their name. These indirectly affect their attendance to class.
Teacher	Attendance calculation is tedious. Have to spend lot of time to prepare student attendance report for daily, monthly and yearly. Sometime miss out to produce warning letter due to overlook on the student's absenteeism record. Unavailability of space to record student who have provided reason on their absenteeism.
Admin Staff	There is no immediate <i>system</i> available for them to check the student's attendance record at any point of time needed. Difficult to retrieve student particulars to prepare warning letter, because there is no centralized <i>system</i> available for the admin staff to retrieve the details.
Person in charge for the student card	School student record such as personal particulars, co-curriculum activity details are not kept in one centralized repositories which will contribute to inefficiency of record retrieval.

IV. SYSTEM DESIGN

Design is very important aspect need to be emphasized in any application development process[11]. Design determines the success of an end product. *System* design outlined into 2 types of design; which is architecture design and functionality design.

A. Architecture Design

Due to cost constraint, student attendance *system* in Malaysia secondary school use bar code scanner to record student attendance. The data captured using bar code scanner sent to the attendance *system* for the purpose of recording and preparing attendance record. Refer Fig 4 to the high level view of the student attendance *system*. Architecture diagram shows the relation between internal and external entities in the student attendance *system*.

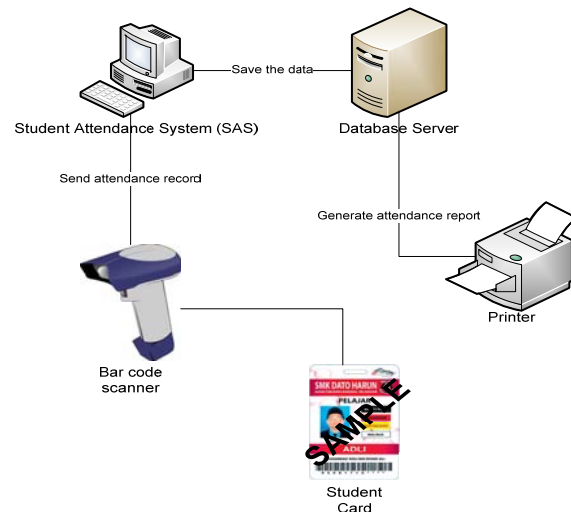


Fig 4 Architecture design

Bar code scanner used to scan the student card which contains the student identification number. The twelve digits then send to the attendance *system* and it will remain displaying student record for 5 second before change to the state to accept another student card number. Each recorded data will be send to the database which developed using database processing application. Structured query language (SQL) used to query data to produce various kind of student attendance report.

B. Functionality Design

Student attendance *system* consists of many functions that determine the purpose of the *system*. Since the *system* directly not involved student involvement, the actor/user of the *system* is school admin staff and teacher. Different user serves different purpose into the *system*. Refer Fig 5 for the overall illustration on *system* functionality and the involvement of user into the *system*. Use case diagram is one of the diagrams listed under Unified Modelling Language (UML) that depict the interaction between the user and *system* [12]. Some of the activities in the *system* require the involvement of both user and the data updated by the user will be recorded sequentially into *system*.

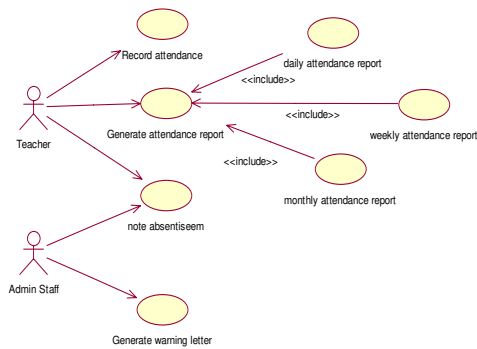


Fig 5 Use case diagram - system functionality

Attendance report generated by teacher divided into three type of report such as daily, weekly and monthly report as documented in manual attendance record. Indirectly this *system* also aid in generating warning letter to students who didn't fulfil the school requirement on the attendance matter.

V. SYSTEM IMPLEMENTATION AND TESTING

SAS been implemented into one of the secondary school in Selangor state of Malaysia. The student already been equipped with student card which contain bar code. Student attendance recording process been assigned to the people who responsible to add the data. User acceptance testing conducted among few user categories before the *system* being released into the production. The measurement is on the satisfaction of the user towards student attendance *system*. Qualitative analysis used in determining the effectiveness of the *system*. Interview method used to gather the information on the user satisfaction. List of interviewee as shown in TABLE II in which interview personnel has been divided into four categories.

TABLE II
INTERVIEW LIST

Interview Personnel	Number of participant
Student	20
Teacher	10
Admin Staff	5
Person in charge for the student card	2

Upon completion of interview session, SAS development team has found out the *system* got the high demand from the school admin staff. With the previous process they have to generate the warning letter manually which took longer process to track the student attendance record. SAS help them to find the record easily and generate the warning letter effectively (refer figure Fig 6). Apart from that, user find it appropriate to display the student record with the

profile picture so that the identification of student will be easier and efficient (refer to Fig 7). The overall menu for the *system* as illustrated in the Fig 8.



Fig 6 Sample warning letter generated using SAS

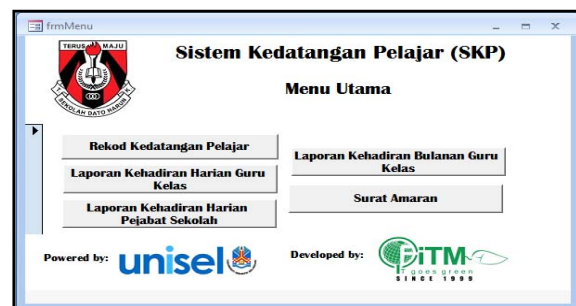


Fig 8 SAS Main Menu

VI. CONCLUSIONS

School attendance determines the academic achievement of a student. An application required by most of the schools in Malaysia in order to ensure efficient attendance record keeping. Student attendance *system* (SAS) that developed for

secondary school expected to replace the manual attendance recording process at schools in Malaysia. SAS can reduce the time spent by teacher in calculating the percentage of attendance for a student as well as for a class. In a click of button teacher can generate report at any point of time. Moreover, student's image which displayed after the scanning process expected to help teacher identify students before record their attendance. **During SAS launching session, user acceptance test has been conducted and feedback from potential users being gathered. Feedback given by users highlighted few issues that need a consideration from SAS development team. Since SAS is still under construction, the maintenance and disposition phase will be kept in view for the future research and improvements.**

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