INFORMATION SYSTEM-BASED AUTOMATED TUTOR ATTENDANCE USING BARCODE SCANNER IN INTERNATIONAL BOARDING SCHOOL PESMA KH MAS MANSYUR

This Final Project Compiled as a Condition to Complete Bachelor Degree Program at Department of Informatics Faculty of Communication and Informatics

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APPROVAL PAGE

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SCIENTIFIC PUBLICATION

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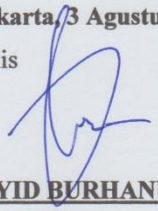

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INFORMATION SYSTEM-BASED AUTOMATED TUTOR ATTENDANCE USING BARCODE SCANNER IN INTERNATIONAL BOARDING SCHOOL PESMA KH MAS MANSYUR

Abstract

Tutor attendance system is an aspect towards educational institution to monitor the activity of tutor which recaps the process of teaching. Poor recapitulation results in incorrect wage for tutor and also affects learning process quality. Furthermore, innacurate attendance data will also leads to wrong decision making for the institution while manual attedance marking wastes valuable time and energy. A preferred solution is through information system-based attendance that automatically records the attendance of tutors which improves the education process. Barcode Scanner is used in aim to utilize the resources available to its maximum benefit also to provide a new, quick, and easy way of registering attendance by reducing the traditional or manual nuances of marking attendance and hence the process will require less resources. International Boarding School Pesma KH Mas Mansyur utilized an education system between tutors and students as a supporting unit to represent the vision of Universitas Muhammadiyah Surakarta in improving student's capability in foreign also religious knowledge, this attendance system is necessary to improve the management of the education and developed in waterfall model with MySQL database and PHP programming language. The output of the system design is an automated information system-based attendance program with barcode scanner in Pesma KH Mas Mansyur. The module menus provided in the system features are check-in function, time table, attendance details, export, and print report. The system was tested using blackbox testing and passed each test, user acceptance also results in satisfactory.

Keywords: Attendance System, Barcode Scanner

Abstrak

Sistem absensi tutor merupakan aspek dalam lembaga pendidikan untuk memantau aktivitas tutor dan merekapitulasi proses pengajaran. Rekapulasi yang buruk menghasilkan gafi yang salah untuk tutor dan juga mempengaruhi kualitas proses pembelajaran. Selain itu, data kehadiran yang tidak akurat juga akan mengarah pada pengambilan keputusan yang salah untuk institusi dan absensi manual menghabiskan banyak waktu dan energi. Barcode Scanner digunakan dengan tujuan untuk memanfaatkan sumber daya yang tersedia untuk dimanfaatkan secara maksimal, serta untuk menyediakan cara pengabsenan baru yang cepat dan mudah serta memerlukan lebih sedikit sumber daya. International Boarding School Pesma KH Mas Mansyur menggunakan sistem pendidikan antara tutor dan santri sebagai unit pendukung untuk mewakili visi Universitas Muhammadiyah Surakarta dalam meningkatkan kemampuan siswa dalam berbahasa asing dan agama, sistem absensi ini diperlukan untuk meningkatkan manajemen edukasi serta dikembangkan dengan waterfall model juga Database MySQL dalam bahasa pemrograman PHP. Output dari desain sistem adalah program absensi otomatis berbasis sistem informasi dengan barcode scanner di Pesma KH Mas Mansyur. Menu modul yang disediakan dalam sistem meliputi fungsi check-in, tabel waktu, detail kehadiran, ekspor data, dan cetak laporan. Sistem diuji menggunakan blackbox testing dan lulus, tes user acceptance juga menghasilkan hasil yang memuaskan.

Kata Kunci: Sistem Absensi, Barcode Scanner

1. PRELIMINARY

Tutor attendance and performance are directly related to student outcomes, the more tutors are absent, the more their student's achievement suffers. The quality of teaching determines the standard of education in an institution, investing in a system that keeps effective tutors in the classroom should be a priority for school leaders and policymakers (Sarker, Hossain& Jamil, 2016). A key part of that effort is creating a school climate where consistent tutor attendance is part of the norm (Moore, Jensen & Hatch2003).The problem statement is that manual process attendance is very tedious and hard to track. The conventional attendance method is also cumbersome when the mark amount is pretty large (Mendonca, D'mello& D'souza, 2015).

Smart attendance management system is required in order to develop a decent climate for schools and industies to keep track of attendance (Sarker, Hossain& Jamil, 2016; Apoorv & Mathur, 2016). Academic administrative problem also occures when an institution doesn't have a representative school administrative website or system (Supriyono, et all, 2016; Kurniawan, 2018). Some of the popular implementations are the usage of RFID, Iris, or fingerprint, although biometric systems come with an intrusive instalation and cost required (Mendonca, D'mello & D'souza, 2015; Rathod et al, 2017).In this case study, barcode-based attendance system is a preferred solution for the institution as the institution utilizes barcode for the employess and the residents, barcode-based attendance isa software which utilizes barcode scanner, a machinereadable representation of information in a visual format which consists of a series of parallel, adjacent bars and spaces (Sudha, Shinde, Thomas & Abdugani, 2015; Chaniago & Junaidi, 2016).

International Boarding School Pesma KH Mas Mansyur (Pesma) is one of the central Muhammadiyah regeneration institution. As the institution and unitof Universitas Muhammadiyah Surakarta (UMS), Pesma accommodates 576 students in total and chooses 48 tutors in the field of language, tahsin, and hadits foreach semester. Tutors in Pesmaoriginated from studentswho has endured tests, sessions and has been chosenby Pesma to teach the other students after morning prayers. Until now, the manual attendance of tutor is kept in papers and monitored by the staffslike shown in figure 1. In the end of the semester, the staff responsibility is to recap the tutor attendance as a report to their superior which will affect the decision making to improve the academic section of Pesma for further analysis in the future.

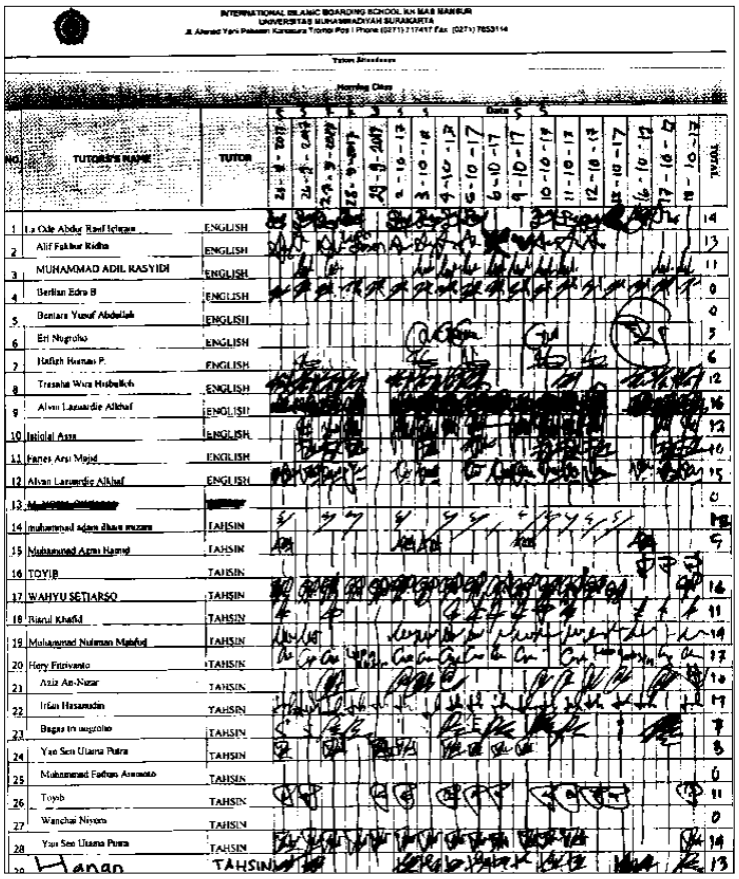


Figure 1. Manual Form

Pesma has nine supporting staffs in total, although tutor attendance management is administrated by only three supporting staffs who were given the responsibility to manage the academic field of the institution. Recapitulation process of manual attendance takes a long time and a high possibility of errors can occure in the process which will disturb the the decision-making process of the institution. Furthermore, the wage of tutors won't be available until all recapitulation is complete. Errors in recapitulation also affects the amount of wage that the institution must spend. Considering the amount of tutor that the institution has, the tedious work that the staff must do, an automated attendance system is considered as necessary.

The aim of this automated attendance system is to support the staff of the institutionto recap the tutor's attendancewith less errorsand to save the attendance data periodically while reducing the duration of the entire attendance taking process. In addition, the system also integrates the academic information system as the base of information used in the attendance.

2. METHOD

This system is made with the waterfallmodel which consist of system requirements, software requirements, analysis, program design, coding, testing, and operations (Royce, 1970).This automated attendance requires linear barcode, pen-type readers, and a windows server computer. Linear barcode

is a one-dimensional barcode that is made up of lines and spaces of various widths that create specific patterns that can be used with Pen-type readers which consist of a light source and photodiode that are placed next to each other in the tip of a pen or wand (Sudha, Shinde&Thomas, 2015).

Softwares required in the development of this system are Windows Operating System, Brackets (text editor), XAMPP with it's Apache, MariaDB and Perl, an Open Source application designed for ease usage with it's cross-platform feature. PHP, a server-side script programming language, and javascript are used to program the system. Web browser is also used in the system development.

Based on the interview and analysis with the staffs, the system requiresfive main functions which are registering tutor, determining semester interval for attendance, calculating the wage of tutors,keeping track of tutor's attendance, and automatically makes report of progress. Tutor registration on the system is made by integrating the attendance system with the academic information system of Pesma, the registration process is done simply by updating the position from student into tutor.Supporting staffs can set when the academic period starts and when it ends, they're also capable to set the wage per day for tutor. Once the tutors are registered, they check in regularly before teaching on the PC with scanner. By the end of the semester, the staff can print the progress report directly through the system or alternatively export the data into excel for practical use. All of the implementations described can be shown on figure 2.

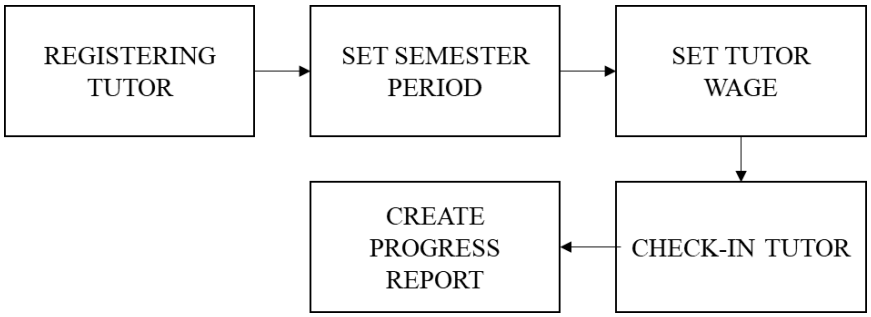


Figure 2. Block diagram of the system's implementation.

Student is given a card with barcode that represent their student-id, student employed as tutor can use the card to check their attendance in the system. Attendance has time interval so no tutor would check-in outside of teaching hour or passing the attendance to other tutor. By the end of the semester, the printable attendance data isshown and can be used as report for the staff's superior.

The analysis on software functional usage is described with a use case diagram. The needs of the user are designed based on the interaction characteristic with the system. There are two main users here: tutors and admin.Admin is responsible to manage tutors among students, accessingtutor's data, setting tutor's wage, setting academic date interval and printing final reports, whilethe tutor needs with the

system is attendance input via barcode scanner.The details of the user interaction are shown in figure 3.

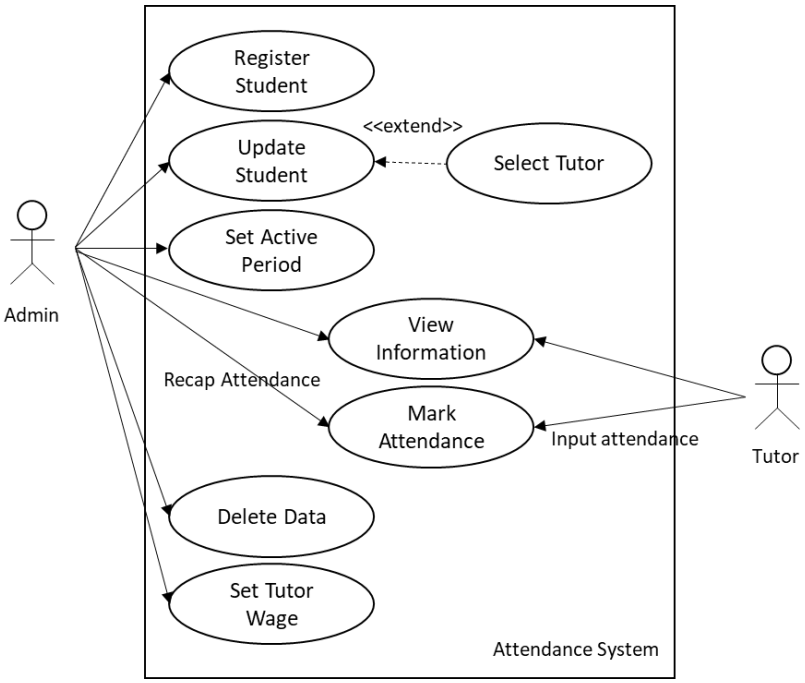


Figure 3.Use case diagram of the system

In order to maintain the data, the recapitulation is saved in tables. The first table is the tutor setting where all setting is saved like the semester interval and wage, then attendance table to filll in the recapitulation process, and the student table where tutor status is saved. There's also user table for the admin. The database designs are shown on figure 4.

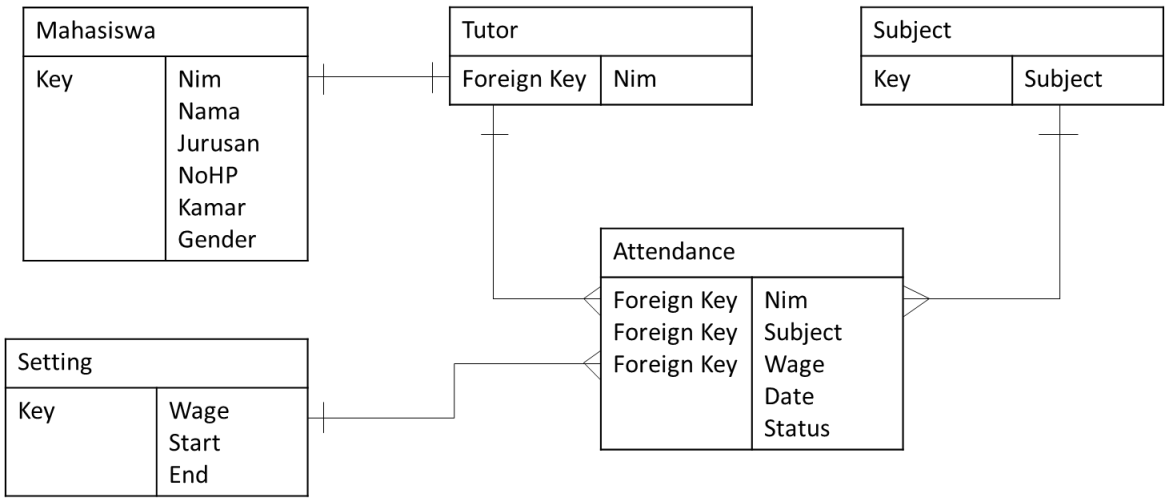


Figure 4. Entity Relationship Diagram (ERD)

The deployment architecture design of the system begins with a PC device and a pen drive barcode scanner,it runs a web browser with PHP, necessary data will be written and retrievedform the database like shown in figure 5.

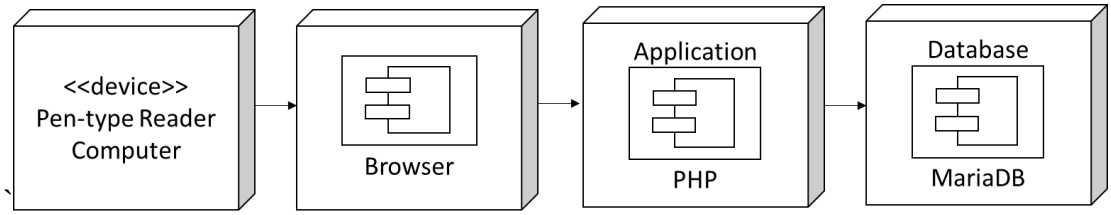


Figure 5. Deployment Diagram

Based on all analysis, there are twopages necessary in the system. The first one is the tutor check-in page, and then the tutor statistic page for admin. The designs are shown in the figure 6and figure 7 below.

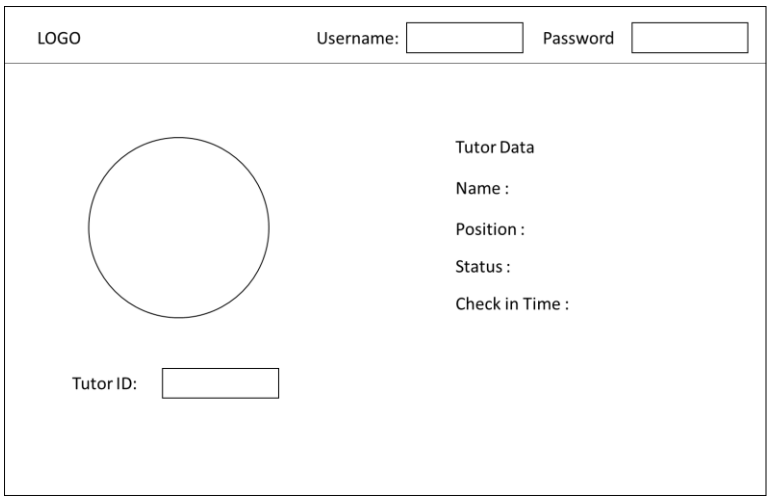


Figure 6. Tutor page design.

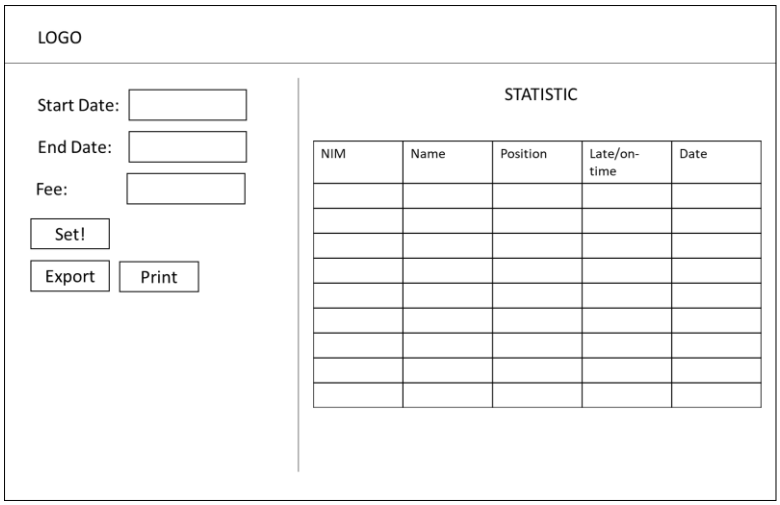


Figure 7. Statistic page design

The system is made using PHP and Hyper Text Markup Language (HTML) with Cascading Style Sheet (CSS) with SQL database, integrated with Academic Information System of Pesma.

The prototype of the system has been tested in the institution to ensure whether the product has been made right and whether the author has made the right product. In this step, the system is tested by the

senior supporting staff as admin to evaluate how the system works and 6 senior tutors who are experienced in the field and knows how the usual process of attendance to determine which part of the system needs to be evaluated. Once they tried the system, qustionnaires are given to know how the user acceptance toward the system. The questionnaire represents performance, interface designs, information representation, and functionability.Each question is given a value with maximum three points. The table below shows the satisfaction result:

Table 1. Users Acceptance Satisfactory

Question	Surveyors							Total
	A	B	C	D	E	F	G	
Question 1	3	3	2	2	3	3	3	19/21
Question 2	3	3	3	3	1	3	3	19/21
Question 3	3	3	3	3	2	2	2	18/21
Question 4	2	3	3	3	3	3	3	20/21

User acceptance test shows the result of the system which the users are satisfied with the end result since the final score is 76 out of 84 or around ninety percent satisfactory. Once the test has been conducted, maintenance is conducted to make sure that the system runs perfectly by doing regular checking and working on user feedbacks if bug occures.

3. RESULT AND DISCUSSION

The attendance system was made with sub modules via attendance input, attendance statistic, time table and recapitulation report feature. To minimalize errors, function test was conducted by expert informatics learner, the result is shown on the tables below.

Table 2. Blackbox Testing Result of Admin Page

No	Case	Test Scenario	Output	Result
1	Login Test	Input username and password, then click login button	System shows dashboard of admin page	Valid
2	View Tutor statistic	Access the tutor statistic page and click the detail button	System shows the tutor statistic of attendance	Valid
3	View Timeline	Access the tutor statistic page and click the timeline button	System shows tutor attendance based on timeline	Valid
4	Add Students	Access the admin dashboard page and click the add student button and input the student’s data	System adds new student in the active student section	Valid

. . . Table 2. Blackbox Testing Result of Admin Page

5	Edit Students	Access the admin dashboard page and choose active students, and then click edit students and edit data	System updates student data	Valid
6	Register Tutor	Access the student edit screen and edit status student as tutor	Student position has been updated into tutor	Valid
7	Delete Student	Access admin dashboard page and choose student and click delete button	The student in the system is erased	Valid
8	Export Data	Access the tutor statitic page and click export data	The attendance data is exported into excel data	Valid
9	Print Report	Access tutor statistic page and click print	Tutor statistic is exported into pdf, ready to print	Valid
10	Logout System	Click logout in the navigation bar	Logout from the system and return to the main page	Valid
11	Set Wage	Access statistic page and set the amount of wage and click set button	The wage of tutor each day is updated	Valid
12	Set Academic Period	Access statistic page and set the start and end period date and click set button	The active academic interval period has been updated and affect attendance	Valid

Table 3. Blackbox Testing Result of Tutor Page

No	Case	Test Scenario	Output	Result
1	Check-in Tutor	Input tutor id via barcode scanner in tutor check-in page	System shows the check-in details, and insert tutor attendance	Valid
2	View tutor statistic	Click tutor statistic button in tutor check-in page	System shows the tutor statistic of attendance	Valid

The system consists of two main pages, they are the tutor attendance screen as shown on figure 8, and admin setting page as shown on figure 9, admin page can access the tutor attendance statistic as shown on figure 10, and the printable report as shown on figure 11.

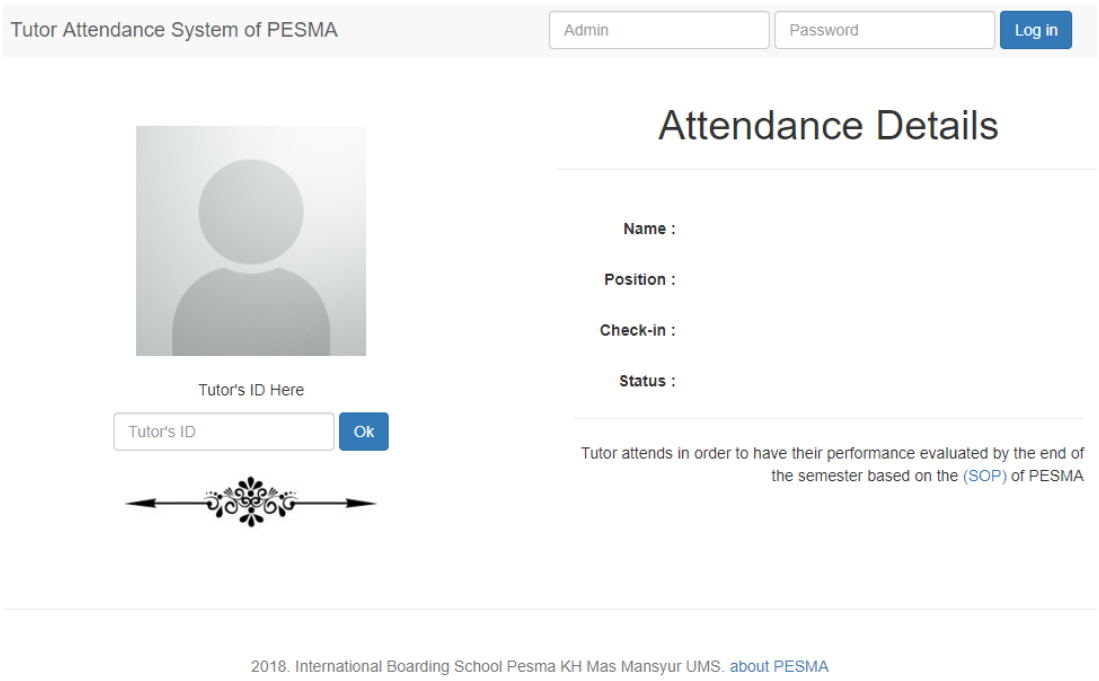


Figure 8. Tutor Page

Tutor page serves as check-in page for tutors and to show the detail of attendance for tutors who checked in, for example like the name of tutor who check-in, their position as tutor, the time when they check in, and their check-in status whether they're on time or late

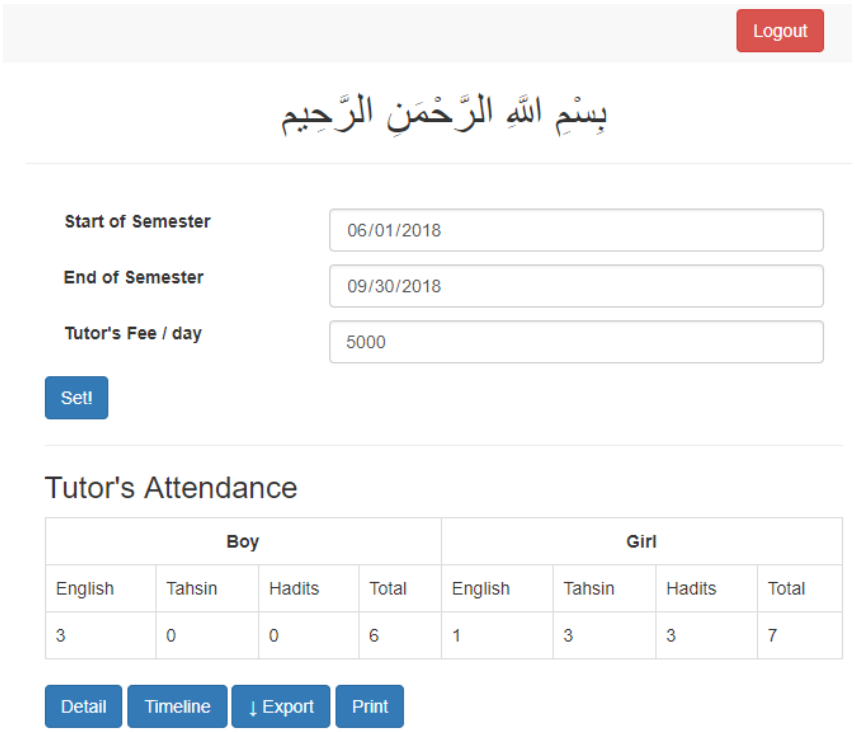
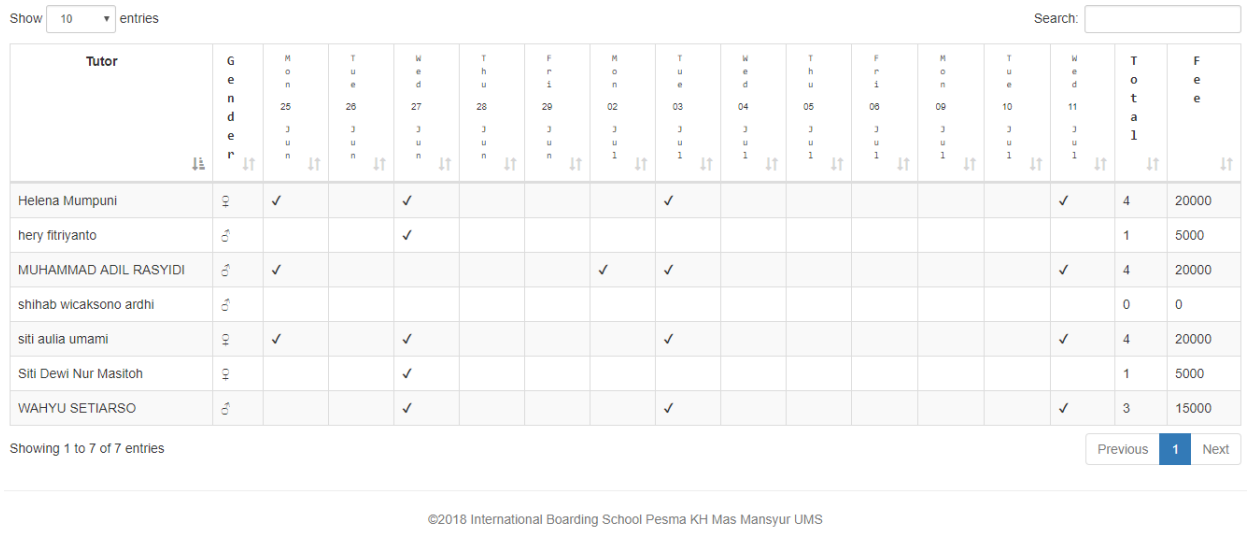


Figure 9. Admin setting page

Admin setting page serves as the control option for suporting staff in determining the active period for tutor to teach and how much wage the tutor gets each time they teach. In this screen, admin can see the detail of attendance and the timeline. Furthermore, they can also export the data into excel for practical use and print the data into pdf as report to their superior.


Show 10 entries

Search:

Tutor	Gender	Mon 25 Jun	Tue 26 Jun	Wed 27 Jun	Thu 28 Jun	Fri 29 Jun	Mon 02 Jul	Tue 03 Jul	Wed 04 Jul	Thu 05 Jul	Fri 06 Jul	Mon 09 Jul	Tue 10 Jul	Wed 11 Jul	Total	Fee
Helena Mumpuni	♀	✓		✓				✓						✓	4	20000
hery fitriyanto	♂			✓											1	5000
MUHAMMAD ADIL RASYIDI	♂	✓					✓	✓						✓	4	20000
shihab wicaksono ardhi	♂														0	0
siti aulia umami	♀	✓		✓				✓						✓	4	20000
Siti Dewi Nur Masitoh	♀			✓											1	5000
WAHYU SETIARSO	♂			✓				✓						✓	3	15000

Showing 1 to 7 of 7 entries

Previous 1 Next

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Figure 10. Time Table and Payment Recapitulation

Timetable screen shows the attendance of tutors in timeline, the timeline shown is adapted from admin setting, when tutor checks-in in a specific date it will show a check mark on the timeline table, here the admin can also see the wage the tutors get from teaching. In this screen, advanced function such as search for specific date and specific tutor are all functionable. Sorting function is also applicable so that we can sort the data based on date, name of tutor, gender, or check-in status. Exporting data from mysql into excel is also functionable so that the staff can use the data for practical use in many different aspects.

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LAPORAN REKAPITULASI TUTOR - *TUTOR RECAPITULATION REPORT*

Boy				Girl			
English	Tahsin	Hadits	Total	English	Tahsin	Hadits	Total
5	0	0	12	1	4	4	9

NIM	Name	Tutor	Date	Gender	Status
B10A163009	MUHAMMAD ADIL RASYIDI	Tutor English	Mon 25 Jun	boy	On Time
A320170026	Helena Mumpuni	Tutor Hadits	Mon 25 Jun	girl	On Time
A310170185	siti aulia umami	Tutor Quran	Mon 25 Jun	girl	On Time
G000154010	hery fitriyanto	Tutor Hadits	Wed 27 Jun	boy	On Time
D300150060	WAHYU SETIARSO	Tutor Quran	Wed 27 Jun	boy	On Time
A310170185	siti aulia umami	Tutor Quran	Wed 27 Jun	girl	On Time
A320170026	Helena Mumpuni	Tutor Hadits	Wed 27 Jun	girl	On Time
A310170018	Siti Dewi Nur Masitoh	Tutor English	Wed 27 Jun	girl	On Time
B10A163009	MUHAMMAD ADIL RASYIDI	Tutor English	Mon 02 Jul	boy	On Time
D300150060	WAHYU SETIARSO	Tutor Quran	Tue 03 Jul	boy	On Time
A310170185	siti aulia umami	Tutor Quran	Tue 03 Jul	girl	On Time

Figure 11. Recapitulation Report

Recapitulation report shows all the data of attendance in pdf format and can be printed to be shown to the staff's superior for further consideration

4. CONCLUSION

Based on result and discussion of this final project, there are conclusions that can be taken as follow: Attendance system using barcode scanner in International Boarding school developed and integrated with the Academic Information System of the institution can assist tutor attendance mark and reduce the tedious work of supporting staff.The system is able to manage attendance data and show the statistic data in a represetantion that is easier to understood. This system can also give precise amount of wage that the institution must spend for the tutor. Furthermore, it is capable of making report of attendance for the superior.The system is light and can serve rapid changes without a need to worry for connection problem.

This final project leaves rooms for improvement, there are further possible development for the future such as: a. Integrating the tutor attendance with student attendance, b. Developing a system dedicated to room coordinators, another position that the institution has, c. Making the system online

so that the superior can monitor the activity of tutors live without waiting the staffs to print the report.

Making tutor account so that they have more control over managing their students.

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