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Multi-purpose UTHM Smart Matric Card System

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Abstract: Smart cards have been available for so long, it has capacity and potential to make world advances in digital technology. Web-based systems are a particular type of software that allows users to interact with a remote server through a web browser interface and cloud database. Radio frequency identification is gaining popularity as an identification technology due to its low price, light weight, small size, and low maintenance costs. As the result, the project considers the previously stated issues and discuss how RFID and smart card as an emerging technology can be integrated with web-based system developed using HTML, CSS, PHP, XAMPP and JavaScript which proposed to manage various functionality of matric card. A single smart matric card system with RFID integration has the potential to make student's life easier. For the result, the system will track and display the information by using student smart matric card via graphical user interface (GUI) upon user request. The database will enquire SQL as the database program and XAMPP as the hosting.

Keywords: Smart Card, Web-Based System, Radio Frequency Identification, SQL, Matric Card, XAMPP, Javascript

1. Introduction

All university students are issued with a student ID card which is understood as the matric card. This matric card is valid for the duration of the program in keeping with their course. Matric card is provided by university during orientation week once they first commence their studies. Each student receives a matric card as identification and verification of his or her status. [1] Apart from identification, matric card is additionally used for security check for entry and movement within the campus, to use for library facilities and sports facilities and to use for medical treatment at the university's clinic. Cashless transaction is one of the most evident benefits of smart cards that can be used in university. Smart matric card can also use as an attendance system in the university. Smart matric card also able to function as access control. University can provide access to their room in hostel with smart matric card instead of traditional locks and particular areas such as labs and lecture halls. Smart matric card with

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RFID technology and web-based system solution is critical in student life because that drive to incorporate all-in-one packages. [2]

At present days, students undervalue the aim or use of the matric card. Students believe that having a matric card has no benefits for them. At the instant, locks for rooms in Kolej Kediaman Pagoh, UTHM are currently employing traditional locks on the doors. Students are also unable to identify the person who enters the rooms without permission. The web-based system that is going to be developed is able to keep track of every individual who enters the room. Keeping track of student attendance can also be challenging and time-consuming if done incorrectly. Malaysian university students are required to attend at least 80% of their classes each semester. Therefore, this project proposes a web-based system in which students can track the attendance records of every course they registered for the current semester. Moreover, students will bring an oversized sum of cash in their wallets. By developing a smart student card payment system that uses RFID technology to authorize payments using matric cards and can track their transaction history from the system. [3][4]

1.1 Objectives

The purposes of this project are:

i. To develop a system which students can track of individual who enters their hostel room which implemented RFID door lock that can be unlocked by using student smart matric card.
ii. To create a system that can track the transaction history and simplifying the purchasing activity of students in the UTHM campus.
iii. To design a system through which students can access their attendance records for every course they registered for current semester.

1.2 Scopes

For complexion of the objective of this study, there are a few scopes of works that must be taken into reflection.

i. This study will focus principally on the design of web-based system of multi-purpose smart matric card access via HTTP and PHP.
ii. Multi-purpose smart matric card system developed by using Web Application Development to ensure students can view related information in the system.
iii. This study implements the data transmission between smart matric system and cloud database for cashless payment monitor, attendance and door lock systems.
iv. This study establishes a system for multi-purpose smart matric card in order to function appropriately for all of its intended uses.

2. Materials and Methods

2.1 Materials

The main material needed and used in this research is to develop a web-based system. Web-based system is a type of software that enables users to interact with a remote server via a web browser. In recent years, they have exploded in popularity, replacing desktop applications and becoming an indispensable tool around the world. For instance, in a database the client is the application through which the user inputs data, whereas the server is the application that saves the data. The server-side script stores and retrieves data and requires specialist programming languages. [5] The server-side script stores and retrieves data and requires specialist programming languages. A web system functions via a combination of server-side and client-side script. These apps can be accessed from any computer over

the internet, rather than having to be manually installed on each machine from which they are to be accessed. [6]

2.2 Methods

Regardless of the purpose for which a web system is created, this type of system works on a client-server model. Therefore, the following components are distinguished in the structure:

- Client-side - responsible for the actions performed by the user
- Server side - responsible for the processes occurring on the server
- Database - a structure for orderly storage of information and access to it

The server-side scripting language that is used to create dynamic web pages that can interact with databases is PHP or Hypertext Preprocessor. It is a widely used open source language that is specifically used for web application development and can be embedded within HTML. The database for the system is created using XAMPP which is a popular open source package used for PHP development. A relational database's data can be easily maintained with the help of XAMPP, which includes MariaDB, PHP, and Perl. It also offers a graphical interface for SQL in phpMyAdmin which is open source administration tool for MySQL. [7]

Moreover, JavaScript which is a text-based programming language used on both the client-side and server-side that allows you to make web pages interactive and particularly for adding various dynamic functions for the system. HTML or Hypertext Markup Language and CSS or Cascading Style Sheets are two of the core technologies for building web based system where HTML provides the structure of the page and CSS responsible for the presentation of documents written in a markup language. Bootstrap is a free, open source front-end development framework which used for the creation of this web-based system. The benefit of using bootstrap is because provides a collection of syntax for template designs for the system. [8]

2.3 System Block Diagram

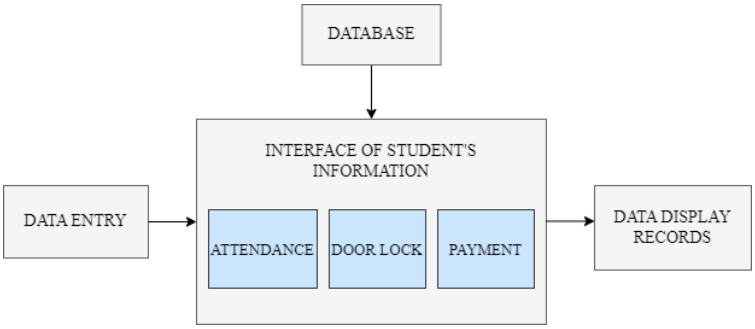

Figure 1: Block diagram of system

Figure 1 above shows the system block diagram of multi-purpose smart matric card system. This block diagram has classified into two main categories: the client side, which implemented the primary data transmission to the server: the server side, which implemented the data processing. This block diagram has three different functions. These functions are with this smart matric card system combine and interact with hardware we can use for RFID based attendance system in our classrooms, RFID based door lock system for hostel rooms and RFID based cashless payment monitoring system within the campus. With this system, the students will be able to track and records their attendance to places like lecture hall and laboratory. Students can also make cashless payments using their smart matric card at shops in the campus. Students can reload their money in the matric card in nearby self-service kiosk. Other than that, students can also use smart door lock instead of regular key and track every entry of their rooms in the system. [9]

2.4 System Flowchart

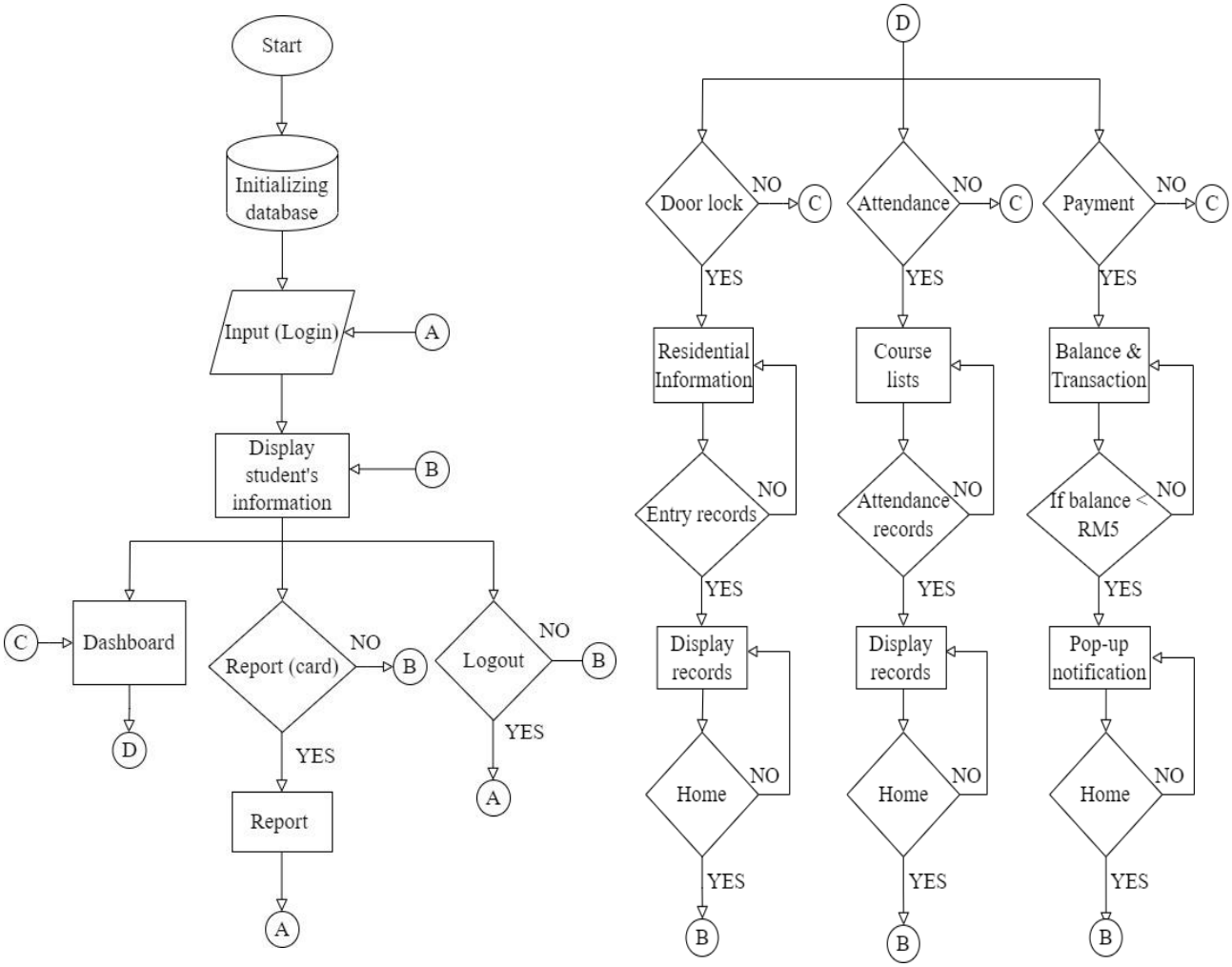

Figure 2: Flowchart of system

Figure 2 above shows the flowchart of the system which include attendance system, door lock system and cashless payment monitoring system. In this system, consists of three main functions which mention above. So, when a smart matric card automatically registered in this system, it will become multi-purpose smart matric card for students to use in campus. This system consists of database which created in MySQL and connect with system through HTML. Students can login into the system using username and password that given by university. This system is web-based system which is an application that is accessed through HTTP. All the data and information that register in this system will be stored in cloud database. The information that stored in cloud database will access for each purpose of this smart matric card when students access for in this system.

3. Results and Discussion

The implementation and operation of Multi-purpose UTHM Smart Matric Card System will be illustrated in this chapter. In this section, the actual results of the multi-purpose smart matric card system are presented in more detail, together with supporting data to confirm the results acquired during the tests.

3.1 Results

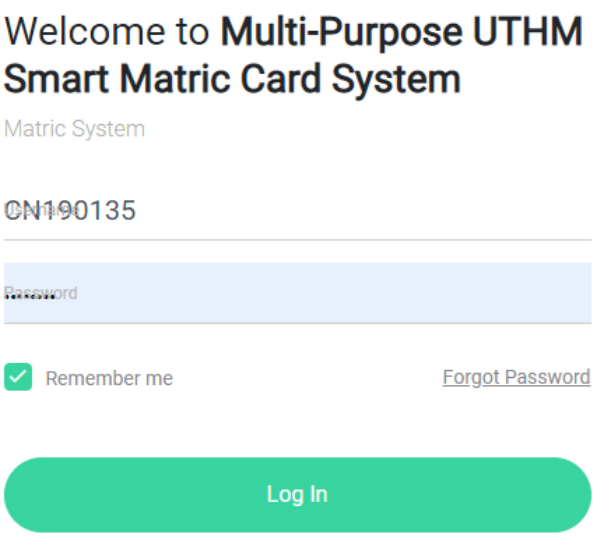

Figure 3: Login page of the system

Figure 3 represents the interface of the login page for the multi-purpose UTHM smart matric card system. In this system, students with active status will be automatically registered in obtaining RFID-based multi-purpose smart matric card system for the usage on campus. Once students enrolled into UTHM, they will have the access for login in this system. Students will be given the username and password for this system which is usually their matric card number. This system was developed using a sample of five students for this project. As a result, each student has different username and password as well as unique information that they can access and track in system from the database.

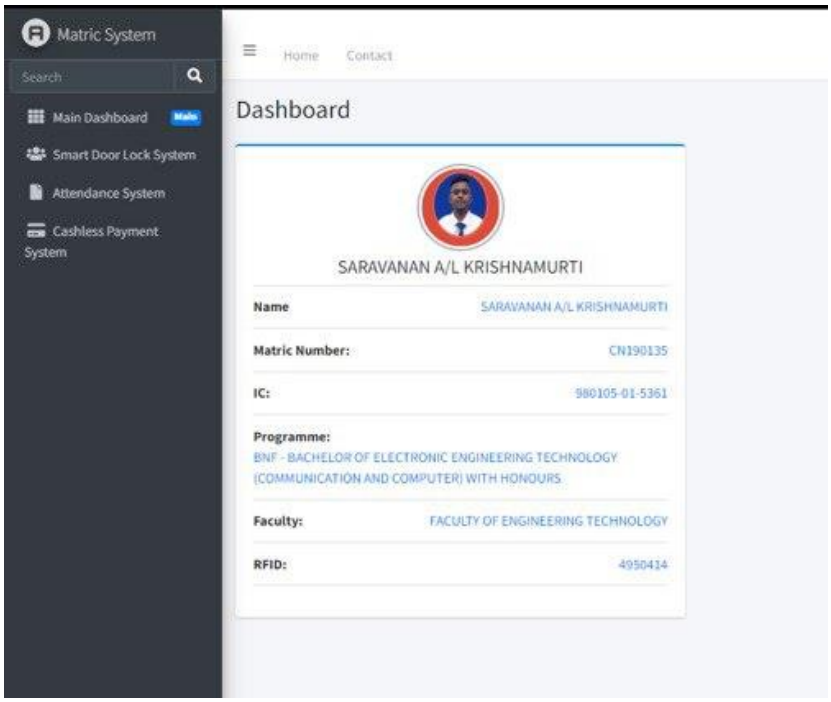

Figure 4: Homepage and dashboard of the system

Figure 4 shows the homepage of the system where user make up their mind about if they should further explore your system for their purpose. Homepage of this system gives users a general notion of the

material they may expect to discover, as well as a general idea of this system as a whole. Once student's login into the system, it will redirect to this homepage where system will display few information of user who login into the system. Students can also have option to logout from the system in the homepage which prevents other users from gaining access to the system without verifying their credentials. Other than that, students can also have the option to contact for report missing card in the system itself which help the user to consume time. If a matric card is stolen or misplaced, it can harm a user's credit score and by reporting it will make the university authorities to cancel the card. Any attempt to use the matric card will be declined. There is also a dashboard in the homepage of the system which contains multi-purpose of this system in one place. This dashboard in the homepage makes easy for students to access and track all the functions of this system in one place.

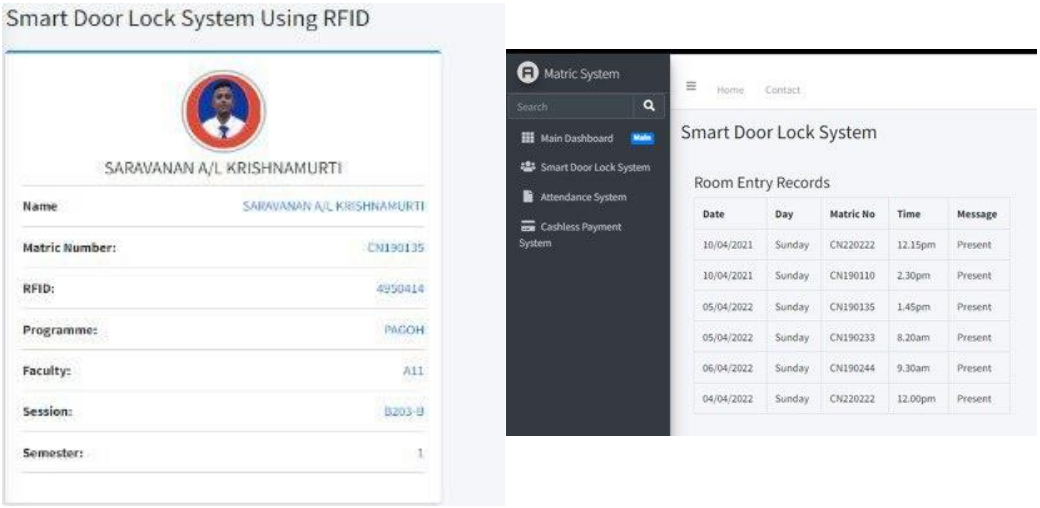

Figure 5: Smart door lock with room entry records

Figure 5 shows the interface of one of the purposes of this smart matric card system which is smart door lock system using RFID technology. In this page, the system displayed the residential information of student who login according to the database. The residential information is such as name, matric number, RFID tag ID, residential college, block and room number according to the database of the system. The student who login can verify whether or not the information matches to them. The objective of this smart door lock system is to track of individual who enters their hostel room which implemented RFID technology door lock that can be unlocked by using student smart matric card. Students can track of individual who enters their hostel room by click at room entry records from the system. This system developed to track of individual who tries to enter unauthorized house in the system so the user can track every individual who enters their house from the system. Students no longer have to worry about forgetting their keys with a smart door lock system.

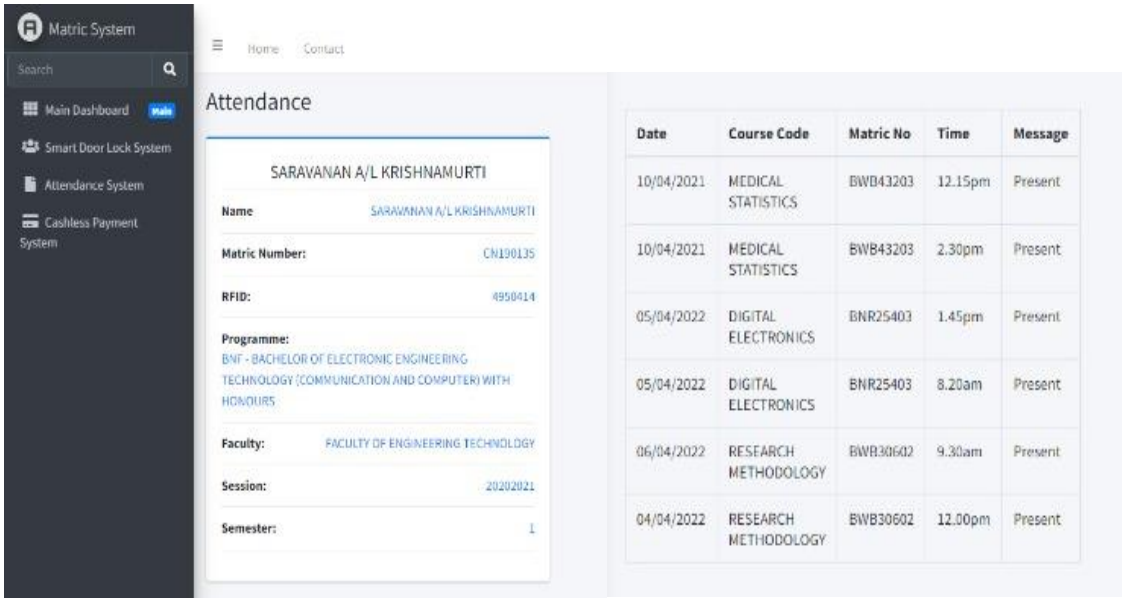

Figure 6: RFID-based attendance system with attendance records

Figure 6 shows interface of one of the purposes of this smart matric card system which is RFID-based attendance system. In this page, the system displayed the academic related information of student who login according to the database. The objective of this project is to design a system through which students can access their attendance records for every course they registered for current semester. This system is also displayed all the course that students registered for current semester. To access their attendance records for specific course in the system, students need to click on the course from the course list which the system redirect to attendance list for specific course. This attendance data can be easily accessed in this system at any time and from anywhere when linked to the cloud server by students. Attendance is important in student's life especially university students because 80% attendance rule is necessary for each course and students can be barred from sitting for the final examination when attendance is below 80% for specific course. This system provides security to the daily operations and safety of the students.

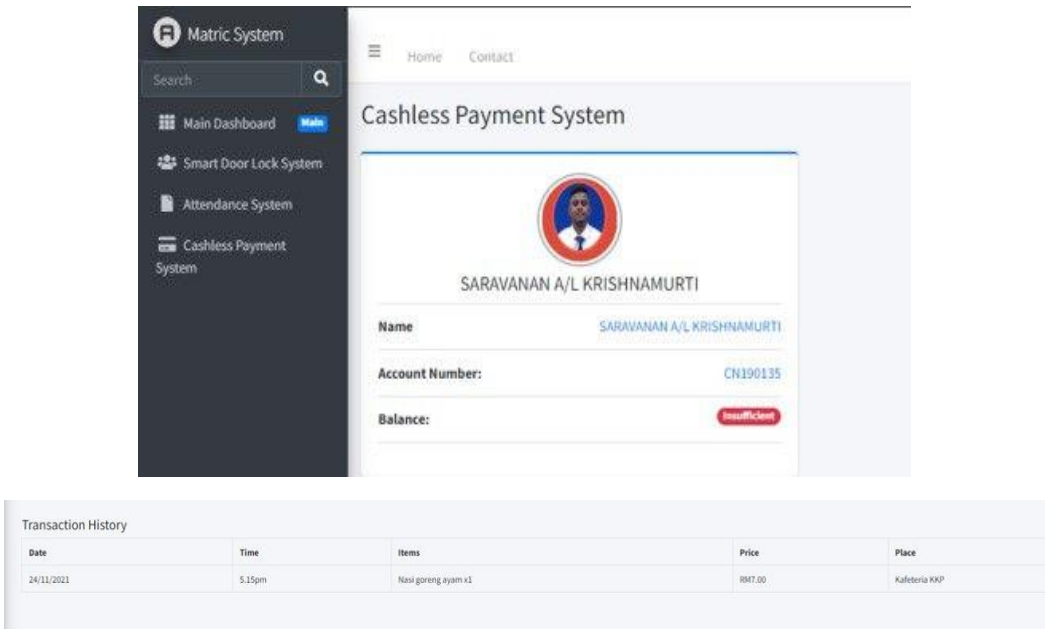

Figure 7: Cashless payment monitoring system

Figure 7 shows interface of one of the purposes of this smart matric card system which is cashless payment monitoring system. In this page, the system displayed the account number which is their matric number and balance in their account of student who login according to the database of the system. The objective of this project is to create a system that can track the transaction history and simplifying the purchasing activity of students in the UTHM campus. This system also notification if the balance is below than RM5 to alert the student to reload in nearby kiosk. Students can also track their transaction history of their spending from the system which shows a period reports the available balance of the account as well as the total amount of deposits and withdrawals for the period. Students are more likely to lose or forget money when hard cash is used as a payment option, and it is always easier and safer to carry a smart matric card rather than large amounts of cash.

3.2 Discussions

For discussion, phpMyAdmin used to handle the administration of a MySQL. phpMyAdmin used to perform most administration tasks, including creating a database, running queries, and adding user accounts for this system. First XAMPP must installed on your system, so that phpMyAdmin can be open and run it on local server for this system.

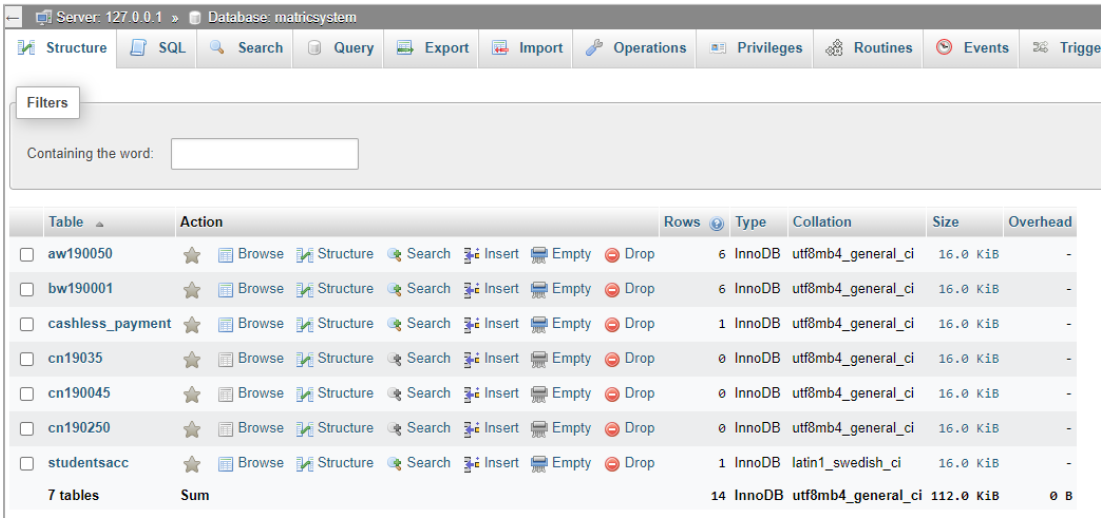

Figure 8: Database of the system in phpMyAdmin

Figure 8 represents the database of this multi-purpose smart matric card system on phpMyAdmin. The database of this system includes of five sample of students and the three functionalities of this system. Databases play a vital part in web based system. The web based system communicates with the database to save and retrieve data for the user of the system. The database stores all of the information that the user requires. If the user wants to access any information from the system, it will retrieve the data from the database where it communicates with the hardware and send it to the system for the user. The benefits of the smart matric card system may greatly simplify the lives of students because of the multi functionality in this system. [10]

3.3 Data Analysis

The table 1 shows the comparison of outcome of student's records suggested by system and Microsoft Access using different students. This research has been conducted using five different students to access and display the data from cloud database of system. Based on the table 4.1 the outcome of data displayed in the system for homepage of the system with the outcome of the database and Microsoft Access. Thus, the system successfully retrieves the data from the database through the end of the system records. Meanwhile as for smart door lock system the outcome data in database system displayed room entry records at the end of the process which means there are several entry records displayed in the table form for each day. The result shown in the system is also same with the data in database. Furthermore, the outcome data for RFID based attendance system is slightly different between the data from the system

database. The data for the attendance system should be record the attendance for each course in separate table meanwhile the database have the table for display the recorded attendance. Moreover, the outcome data for cashless payment monitoring system successfully retrieve the data from the database through the end of the system records. In the database, the transaction history is recorded in the table form to give clear image for user while color in the balance indicate the amount is sufficient or insufficient. The result displayed in the system is also same as the data in database. Page load time is also included in the because delivers a good user experience and conversion rate among users. [11]

Table 1: Performance of system with different purposes

No	Purpose of matric card	Outcome in system	Outcome in database or Microsoft Access	Time (ms)
1	Door lock	Success	Success	2ms
2	Attendance	Slightly different	Slightly different	2ms
3	Payment	Success	Slightly different	2ms

Conclusion

The multi-purpose UTHM smart matric card system is a web-based system created in a JavaScript environment. MySQL and XAMPP databases operate as backups for the system. This is only the beginning of what smart cards as student identification cards may accomplish. As seen by the adoption, smart cards will enhance security in general, efficiency resulting from a cashless society among students, data consistency, and the student card's numerous features. Through the system, it is evident how adaptable, practical, and useable smart matric cards become when a single system with multi-purpose has been developed, hence enhancing the environment in which they were introduced. Moreover, this system of multi-purpose smart matric card can improve their functioning and usability, as demonstrated by the implementation of matric card in the education sector. As my future recommendation is with a complete hardware interact together with this system of multifunctional student matriculation card system has the potential to simplify the lives of students and become a practical application for UTHM's students. [12]

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