

SECURE STUDENT ATTENDANCE SYSTEM
BASED ON GEO-LOCATION AND QR CODE
TECHNOLOGIES

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QR CODE TECHNOLOGIES

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Thesis submitted in fulfillment of the requirements
for the award of the degree of
Bachelor of Computer Science (Software Engineering)

Faculty of Computer Systems & Software Engineering
UNIVERSITI MALAYSIA PAHANG

DECEMBER 2018

ACKNOWLEDGEMENTS

All praises to the Almighty ALLAH S.W.T for His blessing which has given me time, strength, patient, wisdom and ability during developing period of the Undergraduate Project. Thanks to Allah for giving me a lot of strength to finish this project on the given time.

I also would like to express my sincere thanks and gratitude to my supervisor, Dr. Mohd Zamri Bin Osman for all useful guidance, insightful comment and outstanding advice. Apart from that, I would like to express my sincere appreciation for his patient especially when he guides me and give a lot of valuable and practical suggestion during this period.

Furthermore, I would like to express my appreciation to my parents, Ahmat Bin Majid and Rohani Binti Omar who always support me through this period and also not to forget my fellow housemates that always share their ideas and knowledge with me in the way who help me finish this Undergraduate Project 2. Lastly, I would like to express high appreciation to all lecturers and friends that always support and guide me throughout this project. I am grateful to have such a supportive people around me which always shower me with their endless support.

ABSTRAK

Sistem kehadiran pelajar menggunakan teknologi geo-lokasi dan kod QR (*Quick Response*) adalah sebuah sistem yang memudahkan pesyarah mengambil kedatangan pelajar dengan cara lebih sistematik dan mudah digunakan. Sistem ini dicipta sebagai penambahbaikan sistem kehadiran sedia ada. Sebagai contoh, kebanyakan pensyarah di Universiti Malaysia Pahang masih lagi menggunakan kaedah manual bagi mengambil kehadiran pelajar iaitu pesyarah perlu memanggil nama setiap pelajar sebelum memulakan sesi pembelajaran. Kaedah ini mengambil masa lebih kurang 10 hingga 15 minit sebelum sesi pembelajaran dapat dijalankan. Justeru, sistem kehadiran pelajar menggunakan teknologi QR dan geo-lokasi ini dikira sebuah alternatif untuk mengatasi masalah pembaziran masa pembelajaran. Pensyarah cuma perlu meletakkan kod QR pada skrin hadapan kelas semasa sesi pembelajaran. Oleh itu, pelajar hanya perlu mengimbas kod tersebut menggunakan sistem ini. Selain itu, kebelakangan ini sering terjadi kes pelajar meniru tandatangan rakan mereka yang tidak hadir pada lampiran borang kedatangan pelajar yang selalunya akan diedarkan oleh pesyarah pada awal sesi pembelajaran. Sistem ini menyediakan fungsi mengesan lokasi dimana kod QR diimbas. Fungsi ini dicipta untuk mengelakkan pelajar menipu kehadiran mereka di dalam kelas. Sistem ini menggunakan telefon pintar sebagai medan utama kerana telefon pintar telah diaggap keperluan bagi setiap pelajar. Hampir semua pelajar mempunyai telefon pintar sendiri pada zaman serra canggih ini. Oleh itu, sistem ini lebih mudah digunakan oleh pelajar. Kesimpulannya, sistem ini telah diuji oleh pensyarah dan pelajar dari Universiti Malaysia Pahang.

ABSTRACT

Secure Student Attendance System Based On Geo-Location and QR Code Technologies is a system that facilitates lecturers to take attendance of the students more systematic and easy to use. This system is created to improve current student attendance system which uses manual sign attendance sheets. For example, many lecturers in Universiti Malaysia Pahang still use manual method to take attendance of the system, the lecturer need to call name of the students one by one before starting the learning session. This method usually takes about 10 to 15 minutes before the learning session can take place. Hence, this QR code-based system is considered as an alternative to overcome this time consuming problem. Lecturers only need to place a QR Code on the presentation slide for the students scan it using this system through their own smartphone. Additionally, there are several cases where students sign the attendance on behalf of their friends who are absent on that class. This case happens when the lecturers distribute the attendance sheets to the class during learning session. To reduce this unethical practice, the proposed system provides a location tracking function where the QR code is scanned. This function is created to prevent students from cheating their presence in the classroom. This system uses smartphones as the main field because smartphones have been regarded as an ideal for every student. Majority students nowadays have their smartphone so this system is easier to use by them. As a conclusion, this system has been through testing process among students and lecturers of Universiti Malaysia Pahang.

TABLE OF CONTENT

DECLARATION	
TITLE PAGE	
ACKNOWLEDGEMENTS	ii
ABSTRAK	iii
ABSTRACT	iv
TABLE OF CONTENT	v
LIST OF TABLES	viii
LIST OF FIGURES	ix
LIST OF ABBREVIATIONS	xi
CHAPTER 1 INTRODUCTION	1
1.1 Introduction	1
1.2 Problem Statement	1
1.3 Objectives	1
1.4 Scope	2
1.5 Report Organization	3
CHAPTER 2 LITERATURE REVIEW	4
2.1 Introduction	4
2.2 Higher Education System in Malaysia	4
2.3 Student Attendance System	5
2.3.1 Manual Approach Student Attendance	6
2.3.2 Systematic Approach Attendance System	6
2.4 Related Project	7

2.4.1	Biometric Technologies	7
2.4.2	Barcode Technologies	9
2.4.3	Comparison between Various Type of Attendance System	11
2.5	Quick Response Code (QR Code)	12
2.6	Geo-Location	12
2.7	Summary	13
CHAPTER 3 METHODOLOGY		14
3.1	Introduction	14
3.2	Rapid Application Development	14
3.2.1	Rapid Application Development Life Cycle Phases	15
3.3	Preliminary Design	17
3.3.1	System Architecture	17
3.3.2	Flow Chart Diagram	18
3.3.3	Context Diagram	22
3.3.4	Use Case Diagram	23
3.3.5	Dialogue Diagram	24
3.4	Hardware and Software	25
3.4.1	Hardware Specification	25
3.4.2	Software Specification	26
3.5	Gantt Chart	26
3.6	Summary	27
CHAPTER 4 IMPLEMENTATION AND TESTING		28
4.1	Introduction	28
4.2	Implementation Process	28

4.2.1	Software Implementation	28
4.2.2	Geo-Location Implementation	38
4.2.3	Database Implementation	41
4.3	Testing Technique	42
4.3.1	Functional Testing	42
4.3.2	Testing Report	43
4.4	Summary	43
CHAPTER 5 CONCLUSION AND RECOMMENDATION		44
5.1	Introduction	44
5.2	Project Constraint	44
5.3	Recommendation and Future Work	45
5.4	Closing Note	45
REFERENCES		46
APPENDIX A GANTT CHART		47
APPENDIX B SOFTWARE REQUIREMENT SPECIFICATION (SRS)		48
APPENDIX C SOFTWARE DESIGN DOCUMENT (SDD)		49
APPENDIX D USER ACCEPTANCE TEST (UAT)		50

LIST OF TABLES

Table 2.1	Comparison between Various Types of Attendance System	11
Table 3.1	Hardware Items	25
Table 3.2	Software Items	26

LIST OF FIGURES

Figure 2.1	Example of Manual Student Attendance	6
Figure 2.2	Example of Fingerprint Attendance System	7
Figure 2.3	Example of Face Recognition Attendance System	8
Figure 2.4	Example of Attendance System using Barcode Scanner	10
Figure 2.5	Example of QR-Code	12
Figure 3.1	Phases of RAD Life Cycle	15
Figure 3.2	System Architecture of Secure Student Attendance System Based on Geo-location and QR Code Technologies	17
Figure 3.3	Flowchart of Secure Student Attendance System Based on Geo-location and QR Code Technologies in student view	18
Figure 3.4	Flowchart of Secure Student Attendance System Based on Geo-location and QR Code Technologies in lecturer view	20
Figure 3.5	Flowchart of Secure Student Attendance System Based on Geo-location and QR Code Technologies in admin view	21
Figure 3.6	Context Diagram of Secure Student Attendance System Based on Geo-Location and QR Code Technologies	22
Figure 3.7	Use Case Diagram of Secure Student Attendance System Based on Geo-Location and QR Code Technologies	23
Figure 3.8	Dialogue Diagram of QR Code-Based Attendance System	24
Figure 4.1	Microsoft Visual Studio 2017 Interface	29
Figure 4.2	Login Interface for Admin and Lecturer	30
Figure 4.3	Code for Login Page	31
Figure 4.4	Create New Class Interface	31
Figure 4.5	Create New Attendance Interface	32
Figure 4.6	Code of Generating QR Code	32
Figure 4.7	Example of QR Code for Attendance	33
Figure 4.8	Example of List Attendance	33
Figure 4.9	Update Location Interface	34
Figure 4.10	Main Interface	35
Figure 4.11	QR Code Scanner Interface	36
Figure 4.12	Code of QR Code Scanner	36
Figure 4.13	Checkin Interface of Secure Student Attendance application	37
Figure 4.14	Attendance Status Alert	38
Figure 4.15	Plugin of Geo-Locator	38
Figure 4.16	Code of Device Locator	39

Figure 4.17	Code of Distance Calculation	40
Figure 4.18	Example of Attendance Scenario	40
Figure 4.19	Microsoft Azure SQL Database	41
Figure 4.20	Connection for Database Query	42
Figure 4.21	Insert Details into Database Query	42

LIST OF ABBREVIATIONS

RAD	Rapid Application Development
SDLC	Software Development Life Cycle
UMP	Universiti Malaysia Pahang
RAM	Random Access Memory
ROM	Read Only Memory
GB	Gigabyte
MOHE	Ministry Of Higher Education
QR	Quick Response
ID	Identification/Identity/Identifier
CCTV	Closed-circuit television

CHAPTER 1

INTRODUCTION

1.1 Introduction

Universiti Malaysia Pahang (UMP) is one of the universities where most of the lecturers still used manual way for taking attendance of the students. Students still need to manually signing attendance sheet during the class session. This manual method gives students the opportunity to deceive their attendance by asking their friend's help to sign on their behalf. Some lecturer taking attendances of students by calling name of students and manually fill in attendance system at the beginning of the class.

Taking attendance of students using manual method by signing attendance sheets is a time consuming procedure particularly when total number of students in that class are large. Some lecturers taking attendance by calling name of their students one by one at the beginning of the class. This method usually takes around ten minutes per class those total hours that may be lost up to seven hours per semester. This thesis proposes a system that can reduces the time taken for taking attendance by way of nearly 80%.

The projected resolution provides a QR code-based attendance system for the students to scan it via a specific smartphone application. Besides, statistics shows that 42% of smartphone users have an average age of 26 years old. This proves that smartphone is most common device used by students of universities or college in this era. The code will able to taking attendances of students by detecting their important data such as matric id, location and time they entering the class.

This system not only save time but also can avoid the focus of students during learning session will be disturbed. Hence, a systematic Secure Student Attendance System Based on Geo-Location and QR Code Technologies will be needed by the university.

1.2 Problem Statement

The existing attendance system is based on systematic attendance that needs lecturers to call each of their student's names at the beginning of the class to confirm the attendance is time consuming method. Typically, the attendance system is managed by each lecturer. Beside, many of the lecturers still used manual attendance method that required students to sign attendance sheets manually.

This manual method allow students to cheat the attendance by signing attendance for their friend who absent in that class. Other than that, this method also can interrupt the focus of the students during class period.

The lecturer needs to record and keep all attendance sheets. Even though lecturers keeps the attendance sheets by themselves, all attendance sheets still have probability to be lost or damage. Therefore, university should provide an innovative system that able to improve current attendance system more efficiently.

1.3 Objectives

1. To investigate efficient features that can be added to current student attendance system of Universiti Malaysia Pahang.
2. To design and develop a student attendance system that implement geo-location and QR code technologies..
3. To evaluate the effectiveness of the proposed in reducing the time taken for a lecturer taking the attendance of the students and reducing cheating behaviours among students

1.4 Scope

In order to ensure that the objective will be able to achieve, there are few scopes that will be defined. The scopes consist of three categories which are location, hardware and software.

1. Target User

- Students of Universiti Malaysia Pahang
- Lecturer of Universiti Malaysia Pahang

2. Hardware

- Android Smartphone

3. Features

- Real time reports
- Fast Scanning
- One QR code per attendance.
- Required internet connection and GPS
- More secure with limitation of valid attendance is 50 metre from class location

1.5 Report Organization

This document consists of five (5) chapters which are introduction, literature review, methodology, implementation and testing, and conclusion.

Chapter one is the introduction which consists of the introduction, problem statement, objective and scope of the system. Continue to Chapter Two, the literature review of attendance system and the higher education system in Malaysia were discussed. This chapter also discusses about the comparison between the existing attendances systems in several educational institutions.

In Chapter Three, the methodology of this project will be discussed. This chapter covers all diagrams that are used to develop Student Attendance System using QR Code such as use case, context diagram, activity diagram, and class diagram.

Chapter Four is discussed about the implementation of the system in detail. The implementation of the system includes mobile application requirement, web browser requirement and database for this proposed system that has been worked for the thesis. The testing technique and testing report also determined in this chapter.

Lastly, the conclusion of the whole chapters of thesis was discussed in Chapter five. As an addition to future improvements, this chapter contains suggestions for future project improvements based on project constraints.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter will further discuss on the related past studies and knowledge that make important contributions in this area of study, student attendance system and related technologies. It illustrates the current downside or solution done by different parties. This chapter explains intimately techniques, methods, hardware or technologies that applicable to be adjusted within the project.

2.2 Higher Education System in Malaysia

Higher education sector in Malaysia is beneath the ascendancy of the Ministry of Higher Education (MOHE). Malaysia had 28 public universities and 47 private universities registered. All private institute of higher learning come under the Private Higher Educational Institution Act 1996 that permits all public university enrolled to offer higher education and to grant their own degree.

MOHE place a high priority for the internationalization of the higher education sector to boost the global ranking of Malaysian universities. These efforts are created to form a lot of ‘Malaysian Chairs’ at universities abroad. In 2009, SETARA (Rating System for Higher Education Institutions in Malaysia) was enforced as Malaysia’s first classification system. This method enforced to rate the performance of undergraduates learning and teaching in universities in Malaysia wherever the result measured using a six-tier class with Tier 1 as Weak and Tier 6 identified as Outstanding (MOHE, 2015.).

Both public and private universities in Malaysia have their own requirements for their students to get their degree or diploma. For example, Universiti Malaysia Pahang has set that their students are justified not to attend the course but should not exceed

20% absent without letter. If the student exceed absent the lectures more than 20% of the number of lectures specified, they are not allowed for taking final examination for that semester. This rule also has been applied in most of public universities in Malaysia. It is a requirement by the Ministry of Higher Education Malaysia for all local and international students to maintain a minimum 80% attendance in all classes throughout their course of study.

2.3 Student Attendance System

Student Attendance System is a system that uses to track the presence and absence of student in the class. In Malaysia, taking student's attendances is a law and compulsory for a teacher or lecturer mark an absence of any students if the student did not presence in the class. According to Dato' Prof. Dr Rujhan Mustafa, Chief Operating Officer of EMGS at tertiary level of education in Malaysia, attendance of students to classes is mandatory.

The university needs to issue a warning letter for students whose fail to attend classes for 3 consecutive days without any reasonable letters (MOHE Editorial, 2017.).Even the Minister of Higher Education (MOHE) strictly says that attendance of students to all classes is compulsory but there are cases where undergraduates still regularly skips classes without acceptable reasons such as overslept. Today, there are two categories of student attendance system which are manual attendance and systematic attendances.

2.3.1 Manual Approach Student Attendance


 Ahmedabad – 380 006 Gujarat, India. Phone : +91-79-2644 1050, +91-79-2646 4846, 9327000105 (Reg.No.:E123456) Student Attendance Register 2012-2013																	
Gr. No.	Student Name	01-10-2012	02-10-2012	03-10-2012	04-10-2012	05-10-2012	06-10-2012	07-10-2012	08-10-2012	09-10-2012	10-10-2012	11-10-2012	12-10-2012	13-10-2012	14-10-2012	15-10-2012	16-10-2012
588	Shreyansh P Ray	A	P	A	P	P	P	P	P	P	P	A	P	P	A	P	A
597	Raj J Shekhar	P	P	P	P	P	P	P	P	P	P	P	P	P	P	A	P
598	Ushraf K Daruwala	P	A	A	A	A	A	P	P	P	P	P	P	A	A	P	P
600	Mstaid S Ansari	P	P	A	P	P	P	P	A	A	A	P	P	P	P	P	A
601	Harsh A Lunagariva	P	A	A	P	P	P	P	P	P	P	P	P	A	A	A	A
602	Isbita M Tadem	P	P	P	P	P	P	P	A	A	A	P	P	A	A	P	A
611	Pratham K Malvanya	P	A	P	A	A	A	A	P	P	P	P	P	P	P	P	P
612	Lakshmi A Durga	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
616	shivam G Chandak	P	P	P	A	P	P	P	P	P	P	P	P	P	P	A	A
617	Pranshu J Vaghani	A	P	P	A	A	A	A	A	A	A	P	P	P	P	P	P
619	Kush U Kharachariya	A	A	A	P	P	P	P	P	P	P	P	P	A	A	A	A
621	Siddharth M Shah	P	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P
639	Vidish N Brahmachari	A	P	P	P	A	A	P	P	A	A	P	P	A	A	A	P
Total Present		9	9	7	9	9	9	9	10	9	9	8	13	8	7	7	139

Figure 2.1 Example of Manual Student Attendance

Reports Management. (2015.). Retrieved February 10, 2018, from <http://www.iolite.org.in/reports-management/>

Manual Attendance required student to manually sign the attendance sheet that is generally passed around the classroom while the lecturer is conducting the lecture or the lecturer will calling matric id or name of the students one by one before start teaching in the class. For instance, lecturers with an outsized amount of student in that class might find the matter of having the attendance sheet being passed around the class during lecture session and the manual signing of attendance by students are burdensome and most possibly distract them from teaching and getting hundred percent attention from the students. This is not a systematic method where the attendance sheets have probability to lost and may be damaged.

2.3.2 Systematic Approach Attendance System

Systematic attendance system such as Automated Attendance Monitoring System or Biometric Attendance System helps higher education in many ways. This type of attendance system arranged more systematic and the probability of lost and damaged data can be reduced (Garad, Take, Khemnar, Abhang, & Tamboli, 2016). Most systematic attendance systems can reduce time taken and the database report can be viewed immediately by the lecturer. Thus, the system is more efficient than manually sign attendance. But systematic systems also have changes of failure and error of hardware and database.

2.4 Related Project

During this modern era, there are many type of student attendance system that using updated technologies. Hence, there are some examples of student attendance system that have been chosen for comparison. Those example based on latest technologies with is biometric and barcode technologies.

2.4.1 Biometric Technologies

The term biometric comes from the Greek words bios (life) and metrikos (measure).It is well known that humans intuitively use some body characteristics such as face, gait or voice to recognize each other. It is the study of physical or behavioural characteristics used for the identification of a person (Vaidya, 2015).Biometrics usually associated with the use of unique physiological characteristics to identify an individual while biometric system us essentially a pattern recognition system which makes a personal identification by determining the individual by physiological or behavioural characteristic.

2.4.1.1 Fingerprint-Based Attendance System



Figure 2.2 Example of Fingerprint Attendance System

This system uses biometric concept to facilitate the attendance system in educational institutes. This is one of systematic way for taking attendance through fingerprint reading.

Every student can enter the class by login to the system through finger detection. The fingerprint of the student is compared with the one stored in the database and if it matches then attendance is marked for that student. The need for biometric student tracking attendance systems in educational institutes is rising on the grounds that these frameworks are more precise, quicker, and helpful other than being a more compelling device to secure students information and privacy(Mohamed & Raghu, 2012).

2.4.1.2 Face Recognition Based Attendance System

Face recognition technology measures and matches the unique characteristics for the purposes of identification or authentication. Facial recognition software can detects faces in images and then match them against stored data in a database. This technology usually use to scan faces in CCTV footage, as well as to identify persons personalities. Nowadays, face recognition technology also used by Apple for their latest iPhone as a way to identify the owner and unlock their phone. Apple also claims that face recognition technology, called Face ID is more accurate than Touch ID



Figure 2.3 Example of Face Recognition Attendance System







. The system is developed for deploying an easy and a secure way of taking down attendance. The software first captures an image of all the authorized students and stores the information into database. The system then stores the image by mapping it into a face coordinate structure. Next time whenever the registered students enter the class, the system recognizes the students and marks his attendance along with the time. If the student arrives late than his reporting time, the system speaks a warning “you are xx minutes late! Do not repeat this.(Kawaguchi, 2005)

2.4.2 Barcode Technologies

Barcode is a series of black bars and white spaces of varying widths are printed labels to uniquely identify items. The barcodes representation of data; the data usually describes something about the object that carries the barcode. The early implementation of barcodes included the ability identify rail road cars as far back as the 1960s. In the early 1970s, barcodes technologies started showing on groceries racks. To computerize the way toward identifying grocery things, standard barcodes were placed on products. The used of barcodes in business industry are automated to increase productivity and minimalize human error.

2.4.2.1 Type of Barcode

There are two types of barcodes which are linear barcodes and 2D barcodes. Some examples include:

Linear Barcode	2D Barcode
<p data-bbox="236 1173 411 1211">UPC CODE</p> 	<p data-bbox="842 1173 1158 1211">DATAMATRIX CODE</p> 
<p data-bbox="236 1361 376 1400">CODE 39</p> 	<p data-bbox="842 1397 951 1435">AZTEC</p> 
<p data-bbox="236 1451 576 1489">ITF (Interleaved 2 OF 5)</p> 	<p data-bbox="842 1541 986 1579">QR CODE</p> 

2.4.2.2 Attendance System Using Barcode Scanner



Figure 2.4 Example of Attendance System using Barcode Scanner

Attendance system using barcode scanner is a system that takes down attendance using barcode. Every student is provided with a card containing a unique barcode. Each barcode represents a unique ID of students. Students just have to scan their cards using barcode scanner and the system notes down their attendance as per dates. System then stores all the students' attendance records and generates default list. It also generates an overall report in excel sheet for admin. This kind of application is very useful in school as well as in college or universities for daily student attendance.

2.4.3 Comparison between Various Type of Attendance System

Table 2.1 Comparison between Various Types of Attendance System

Criteria	Face recognition Based Attendance System	Fingerprint Based Attendance System	Attendance System Using Barcode Scanner	Secure Student Attendance System Based Geo-Location and QR Code Technologies
Technology	Biometric technology	Biometric technology	Barcode	QR code and Geo-location technology
Hardware	Face Detector	Fingerprint Reader	Barcode Scanner	Smartphone
Cost	High	High	Medium	Medium
Student Acceptability	High	Medium	High	High
Accuracy	Low	High	High	High

2.5 Quick Response Code (QR Code)



Figure 2.5 Example of QR-Code

A QR code is a two-dimensional barcode that is readable by smartphones. The code consists of black modules arranged in a square pattern on a white background. QR code allows encoding over 4000 characters and provides high data storage capacity, fast scanning, omnidirectional readability, and many other advantages including, error-correction so that damaged code can also be read successfully (Deugo, 2015). Nowadays, mobile phones with built-in camera are widely used to recognize the QR code.

2.6 Geo-Location

Geo-location is a modern technology that identifies physical location from computer or mobile device to use that data for some process or function. It is one of the most popular technologies of the current information technologies. The most used of geo-location technologies are GPS, Radio Frequency Identification (RFID) and Wi-Fi. Two ways of data can be collected from geo-location which in an active mode called as user-device-based geo-location or during passive mode that can be referred as data correlation server-based geo-location (Patel & Tiwari, 2017).

Geo-location data have a variety of uses in many applications such as QR code based system and online games. It generally used for three goals which are geo-positioning, geo-coding and geo-tagging. Geo-positioning is a method that determines the location of the point relative to the any surface of the earth while geo-coding is a process of converting a location into spatial data and locating the exact geographical coordinates of the location.

2.7 Summary

To quickly sum up, this chapter discussed about student attendance systems that have been apply today, biometric technologies, barcode and QR code technology that will be used in this project. In addition, the use of QR code and geo-location are suitable for current education environment where almost all students use smartphone with built-in camera and GPS. Lastly, in this chapter also reviews the comparison between the existing attendance system.

CHAPTER 3

METHODOLOGY

3.1 Introduction

Software Development Life Cycle (SDLC) is a framework defining tasks performed at each step in software development process. SDLC consists of detailed plan describing how develop, replace and maintain specific software. SDLC also used for structuring, planning, and controlling the process of developing a system.

This chapter discusses the methodology .There are several methodologies have been developed where all the methodologies have different advantages and disadvantages such as Agile, Incremental methodologies, Iterative and Incremental Spiral, Waterfall, Rapid, Prototyping and others.

3.2 Rapid Application Development

Rapid Application Development (RAD) refers a software development methodology that proposes minimal planning in sided of rapid prototyping. RAD created by James Martin in 1990 as an approach to building computer systems which combines Computer-Assisted Software Engineering (CASE) tools and techniques, user-driven prototyping and project time limits into a reliable formula for high ranking of quality and productivity. RAD improves the quality of complete system while decrease the time taken of build process.

The main objective of RAD is to develop a high quality, high speed and low cost system. In other word, RAD is focus to the structured development methodologies that has short development time. RAD is the process that develops high quality products faster by accelerates the cycle of the development of an application. Figure 3.1 demonstrate the phases of Rapid Application Development (RAD) by James Martin.

3.2.1 Rapid Application Development Life Cycle Phases

Structure of the Rapid Application Development (RAD) lifecycle is created to establish that the systems that build by the developers are the system that the users really need. This lifecycle includes all of the activities and tasks required to interpret business requirements and design, develop the system and implement the system that supports all requirement through the following four phases :

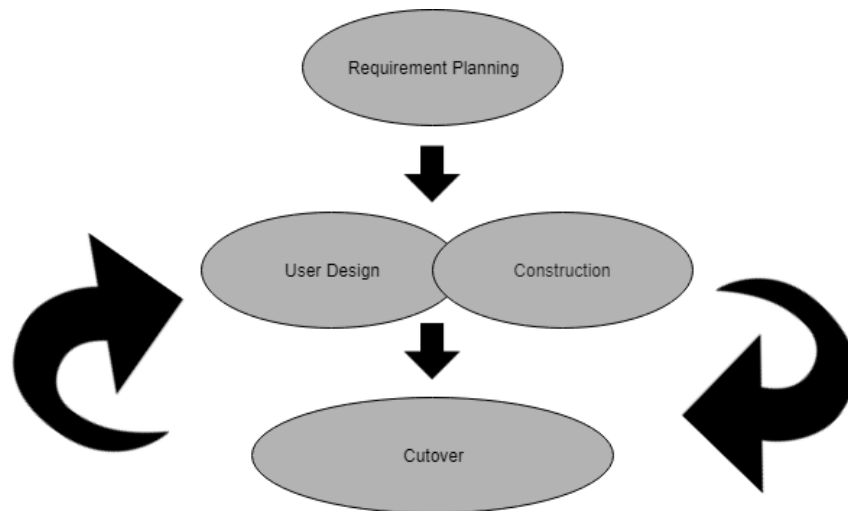


Figure 3.1 Phases of RAD Life Cycle

3.2.1.1 Requirement Planning

This phase takes information gathered through many related sources. There is a meeting between client, supervisor and developer to figure out the project needs, scope and requirement of the system that need to be developed. The requirements from client are important for developer to develop a system. Agreement between client and developer needed to make sure there are no misunderstandings happen after the system have been developed.

For this project, all planning and the requirement of QR Code Based Attendance System collected and combined together to reduce development period during this phase. All requirements gathered from clients and improvement based of several type of attendance systems stated in Section 2.4. Three different type of attendance systems were compared to bring out the improvement that can be made through proposed system. Scope of this project also has been clarified to all teams suitable based on name

of this system which is specific for student attendance at higher education institutes. This specification applied because in tertiary level of education in Malaysia, there are many classes or lectures that have more than 30 students per class. This proposed system can be applied to reduce time taken for the lecturers taking attendance of the students.

3.2.1.2 User Design

User design phase is a continuous process that allows user to contribute during the development process. Users directly interact with system analyst involving all requirement and decisions in requirement planning phase will be compiled back. In this phase, several types of diagrams such as system architecture, flow chart, use case, context, and dialogue diagrams are created.

All of the diagrams created to make users easily understand system flows and architecture before development of the system started. It can lessen the probability of making changes of the system requirement and at the same time reduce the cost of the development. A plan for implementing Secure Student Attendance System Based on Geo-Location and QR Code Technologies is prepared during this phase.

3.2.1.3 Construction Phase

The main objective of this phase is to import detailed design of the system into the real system. All design of the system already described in user design phase. During construction phase, all application features and components are developed and thoroughly tested. The development of QR Code-Based Student Attendance system started based on requirement documents and system designs Users still contributed for any suggestion of changes or improvements as actual screen developed.

Construction phase was repeated often as needed to meets the needs of the systems. One of primary objectives of this phase includes minimising the costs of development by optimizing resources and avoiding unnecessary changes after the development phase over. In this phase, database of the system is designed based on the preliminary design developed in Section 3.3

3.2.1.4 Cutover

Cutover represents the final phase of Rapid Application Development (RAD). It includes the conversion of data, full testing of the system, and changeover of the system. The entire process was compressed compared with traditional methods. As a result, build process is faster and the new system delivered and placed in market much sooner.

3.3 Preliminary Design

This section will discuss all diagrams related to this QR Code Based Attendance System which are system architecture, flowchart, context diagram, use case diagram and dialogue diagram.

3.3.1 System Architecture

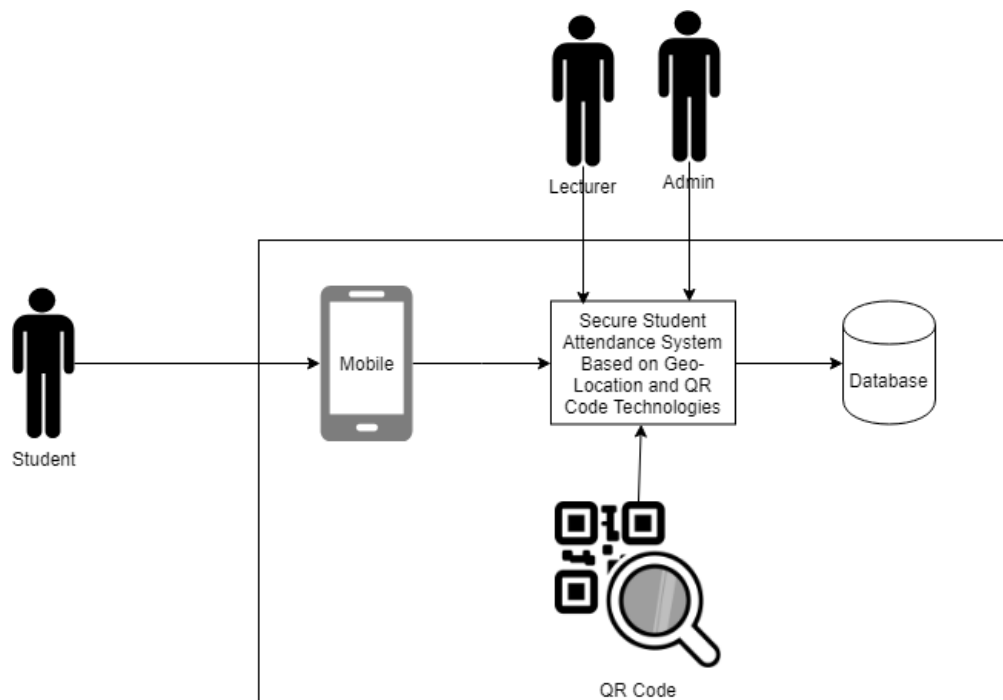


Figure 3.2 System Architecture of Secure Student Attendance System Based on Geo-location and QR Code Technologies

Figure 3.2 show the architecture of the Secure Student Attendance System Based on Geo-location and QR Code Technologies. It consists of design layout that shows how data are being transferred between QR code , mobile application and QR code system..

3.3.2 Flow Chart Diagram

The Figure 3.3 below show the flow of the system based on student as the user. This will be show the flow of the designed system starting as the students open the system application.

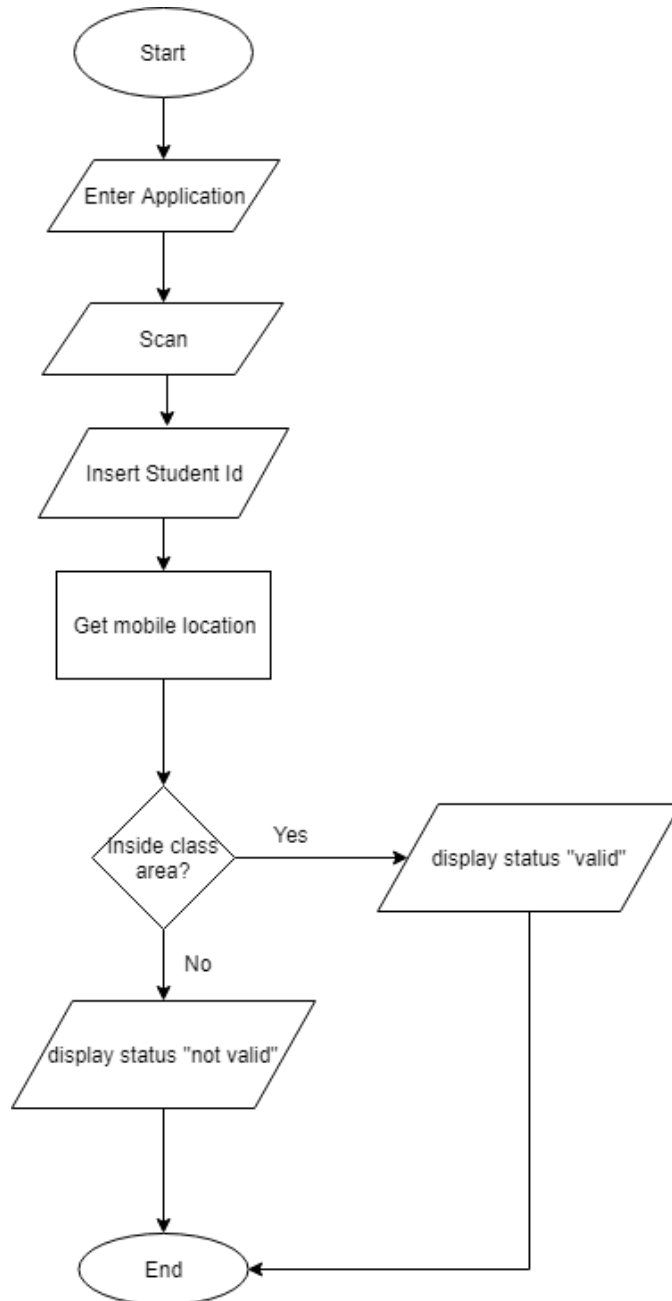


Figure 3.3 Flowchart of Secure Student Attendance System Based on Geo-location and QR Code Technologies in student view

According to the figure above, this system only allow student to scan the QR code provide by the lecturer during class session. After the students scan the QR, they will enter their matric id. When submit button is clicked, location of the mobile device will send into the database of the system. The status will be saved into the database based on the location of the student's device. The attendance will be valid if the location of the device detected inside the class area that has been set.

Figure 3.4 below show the flow of this system based on lecturer view. After lecturer login into the system using staff id and password, they can choose the option listed at the home interface such as add new class, create new attendance, view registered class and view attendance list. If the lecturer chooses to create class, they need to add student list into the class database. To create new attendance, lecturer needs to select the listed class and choose attendance date to generate QR code for that class. After QR code has been generated, lecturer can screenshot or download the QR code image and put it into their presentation slides for students to scan it.

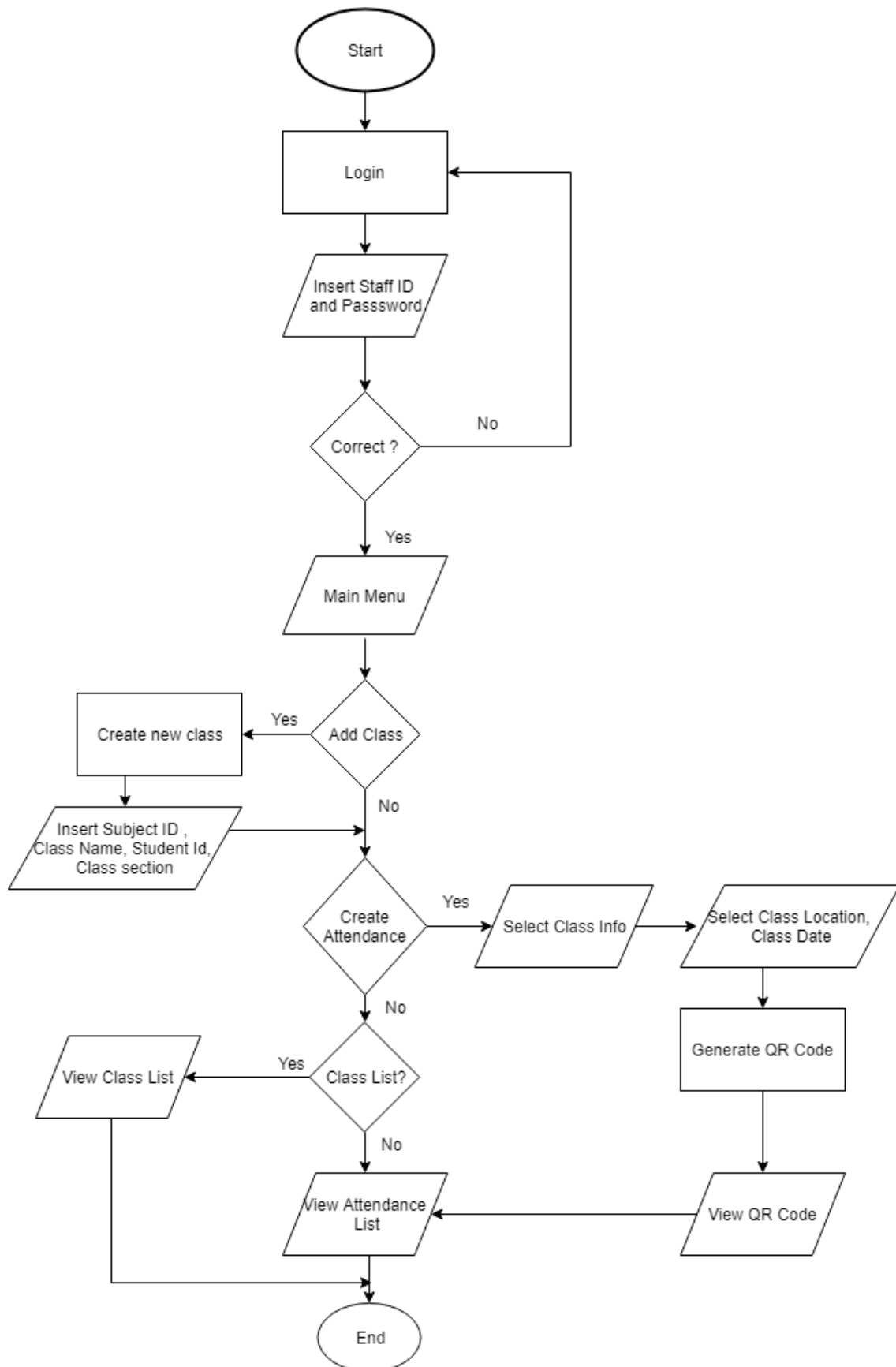


Figure 3.4 Flowchart of Secure Student Attendance System Based on Geo-location and QR Code Technologies in lecturer view

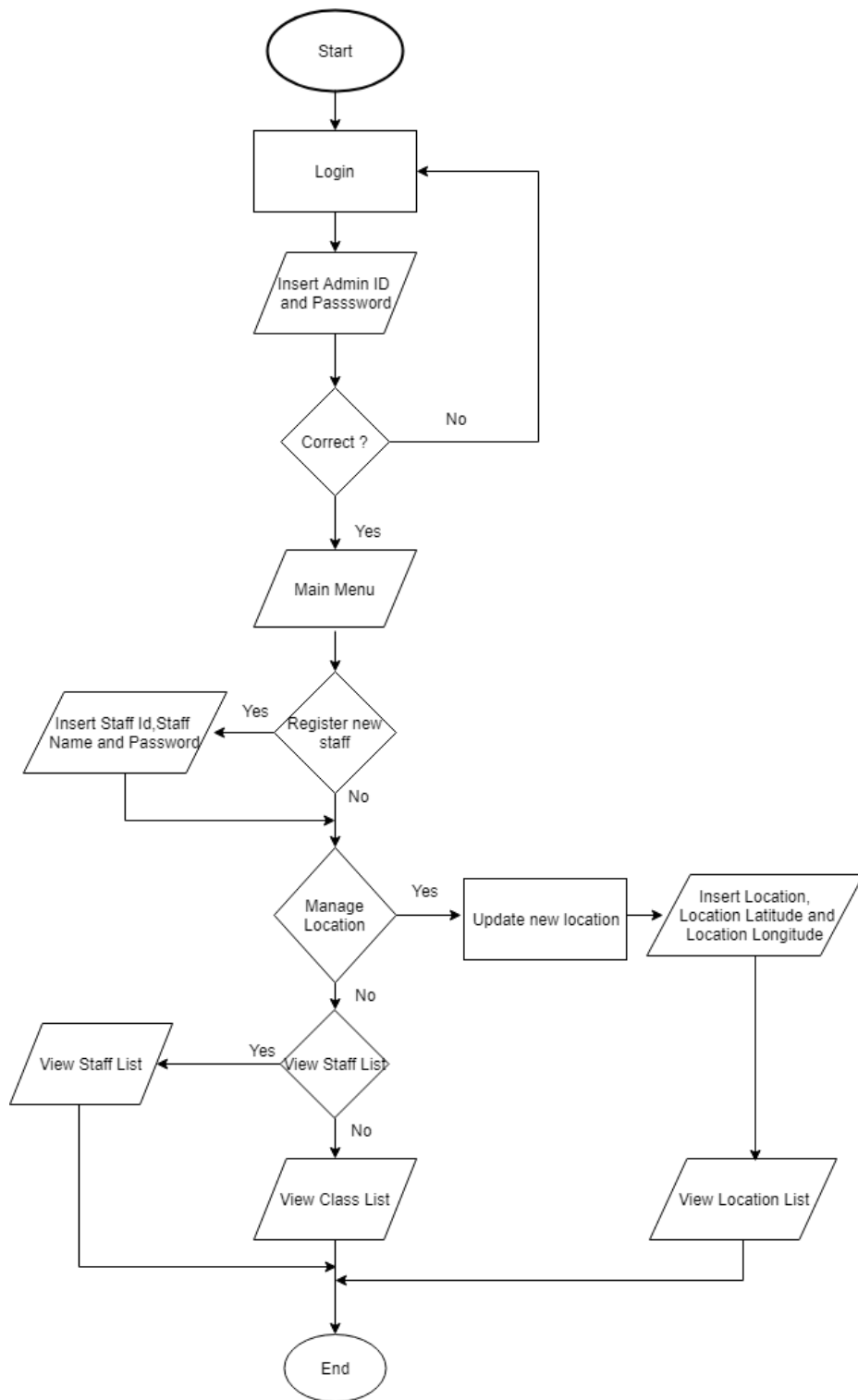


Figure 3.5 Flowchart of Secure Student Attendance System Based on Geo-location and QR Code Technologies in admin view

Figure 3.5 show the view from admin when using this system. Admin required to login into the system using admin id and password that has been fixed in this system. In home page, they can choose to register new staff, view or update location, view class list or view staff list. If they choose to register new staff, they need to insert staff id, staff name and staff password into the database. For view and update location, admin can update location by inserting the location name such as room name, latitude and longitude of the selected location manually. Other than that, admin can view all staff and class registered in this system.

3.3.3 Context Diagram

Figure 3.6 shows the context diagram of this system.

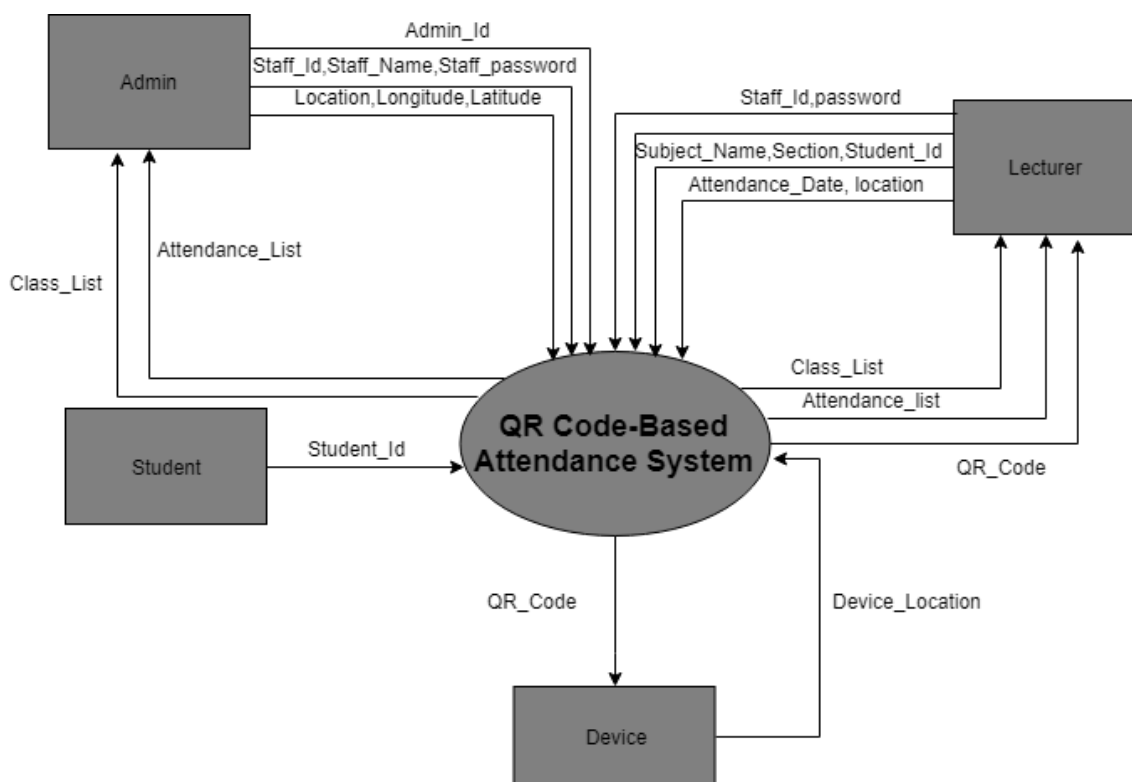


Figure 3.6 Context Diagram of Secure Student Attendance System Based on Geo-Location and QR Code Technologies

Based on Figure 3.6, there are two users that will use this QR Code-Based Student Attendance System which are students and lecturer. Every user only can control certain function only. Students only can register, login, and enter class while lecturers can register, login, add class, create attendance and view attendance. Device used for this system is smartphone. This device use to generate and scan QR code.

3.3.4 Use Case Diagram

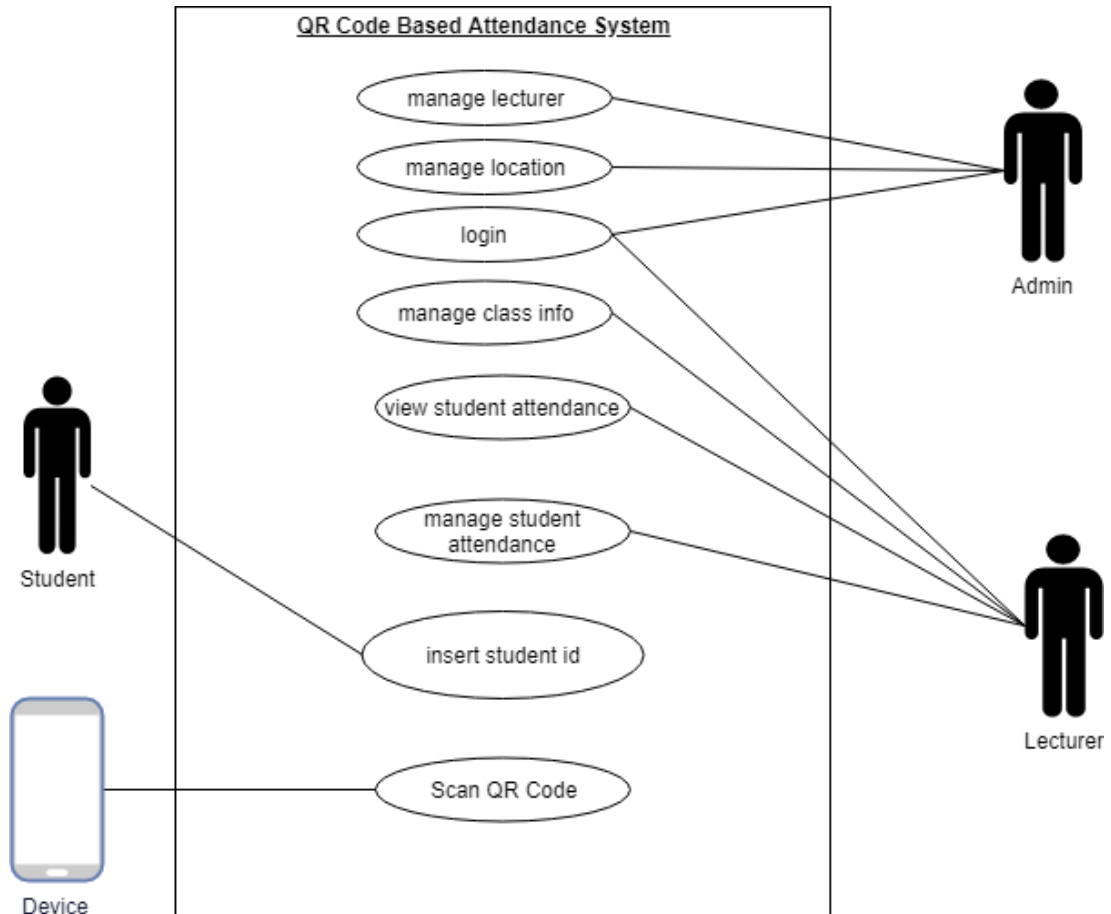


Figure 3.7 Use Case Diagram of Secure Student Attendance System Based on Geo-Location and QR Code Technologies

Figure 3.7 below shows the main function of this Secure Student Attendance System Based on Geo-Location and QR Code Technologies. Student only can scan QR code and insert student id while lecturer can login, manage student info, view student attendance, manage student attendance and generate QR Code. Device used to scan the QR code. Admin has authorization to login, manage lecturer and manage location of the class

3.3.5 Dialogue Diagram

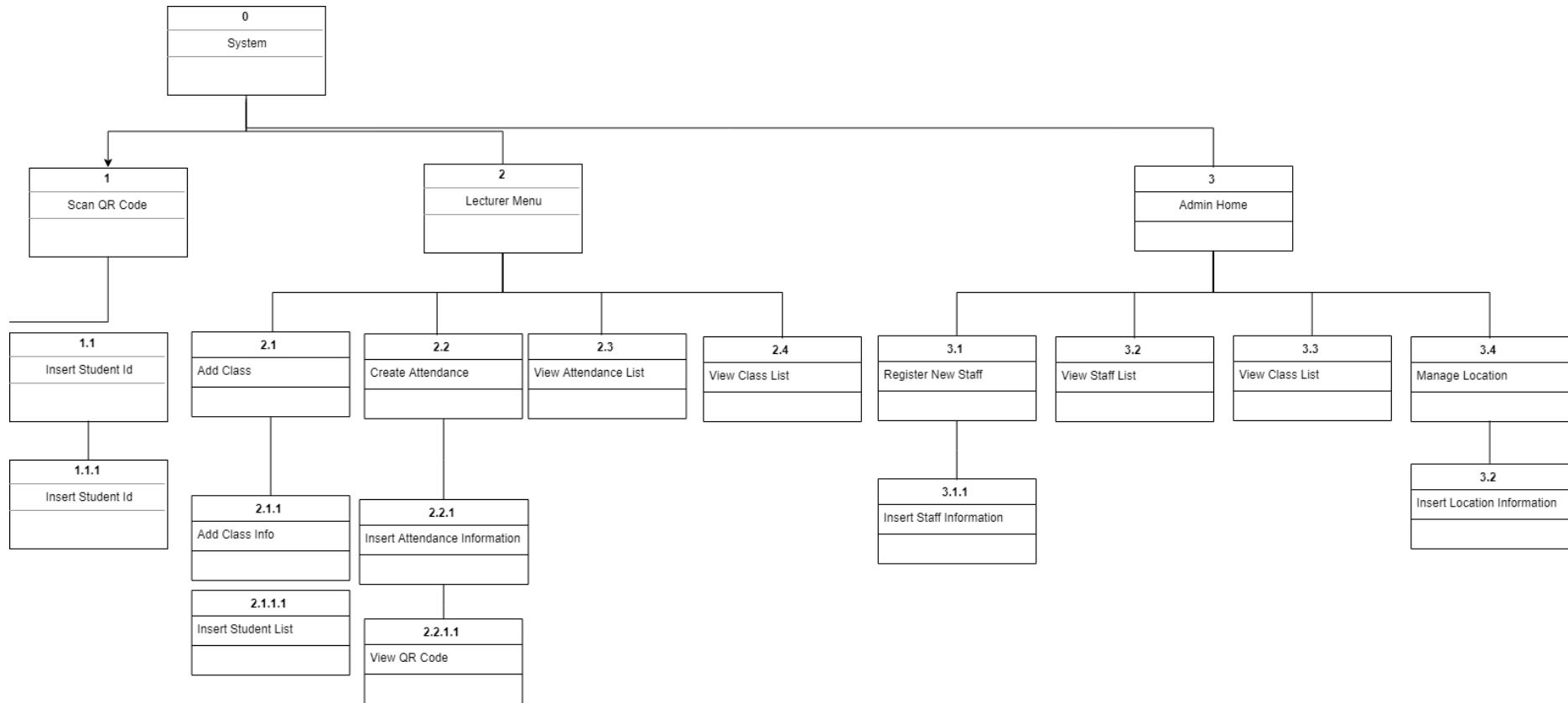


Figure 3.8 Dialogue Diagram of QR Code-Based Attendance System

Figure 3.8 shows the dialogue diagram of this system. This system shows the sequence of screens of the mobile application for this system. All users have different sequence of the screens. Only need to scan the QR code. After scanning the QR Code, students need to insert their student id to enter the class attendance. Different with the students, there are four options at the main menu of the lecturer and admin sides. For lecturer view, the can redirect to create new class, create new attendance, view class list and view attendance interfaces from the main menu while admin can redirect to register new staff, view staff list ,view class list and manage location interfaces.

3.4 Hardware and Software

For the system development and documentation, all needed hardware and software has been listed to make the progress of the system development as being planned and the completed system can be run as expected and smoothly.

3.4.1 Hardware Specification

There are several hardware used for the development of Secure Student Attendance System Based on Geo-Location and QR Code Technologies. Table 3.1 shows a list of hardware used for this Secure Student Attendance System Based on Geo-Location and QR Code Technologies.

Table 3.1 Hardware Items

Hardware	Specification	Purpose	Quantity
Laptop	HP Pavilion 15', x64-based processor, AMD Radeon Graphic	Used for preparation of the proposal, documentation and development of the system	1
Mobile Phone	Vivo Y53, Android version 6.0.1, 1.4GHz Snapdragon 425 Quad-core, 2GB RAM,16GB ROM,	Used to run the system and scan QR code	1
Printer	HP Deskjet 2050	Use to print out all documents of this project	1

3.4.2 Software Specification

Table 3.2 shows the list of software used for this system with the description. The listed software is used from documentation until the development process of this system.

Table 3.2 Software Items

Software	Description
Windows 10 (x64) Operating System	A platform required to make documentation and development of the system
Draw.io	An online tool that used to create and design diagrams used for documentation
Microsoft Office Word 2010	A word processing program to create the documentation
Microsoft Office Project 2010	A management software program used to prepare Gantt Chart.
Google Chrome	A web browser to find information about the system.
Microsoft Visual Studio 2017	A software to develop web application and mobile application
Microsoft Azure	A database software to store system data

3.5 Gantt Chart

Gantt chart is a type of bar chart that demonstrate a project schedule of the entire this Undergraduate Project. The Gantt chart of this project attached to Appendix A.

3.6 Summary

As a conclusion, Rapid Application Development (RAD) model and method has been used to developing this system and the flows of this system has been explained in this section. RAD was chosen based on flexibility in every phases of this model. Based on short period of time, this methodology is most suitable to be used to develop this system because RAD does not require long time to develop the project. Other than that, this chapter also analyse the hardware and software used for the development of this system start from documentation until the end of the development.

CHAPTER 4

IMPLEMENTATION AND TESTING

4.1 Introduction

This chapter review the implementation process of Secure Student Attendance System Based on Geo-Location and QR Code Technologies in details. A general review of the whole implementation process begin with system development using Microsoft Visual Studio 2017 with Xamarin to create web application platform and mobile application platform until testing is carried out. This chapter also includes the clarification of the procedures and discussion to fulfil the objectives of this project.. After implementation process finished, the system are tested to make sure that the result complements with the client requirements as stated in Software Requirement Specification(SRS).

4.2 Implementation Process

This implementation process section explains in details the implementation process and mechanism of this Secure Student Attendance System Based on Geo-Location and QR Code Technologies. It includes the examples of codes implemented for all function and user interface of this system.

4.2.1 Software Implementation

Before development process started, the computer must be set up with tools that used for development such as Microsoft Visual Studio 2017 for development of web and mobile application of Secure Student Attendance System Based on Geo-Location and QR Code Technologies and Microsoft Azure as a database tools.

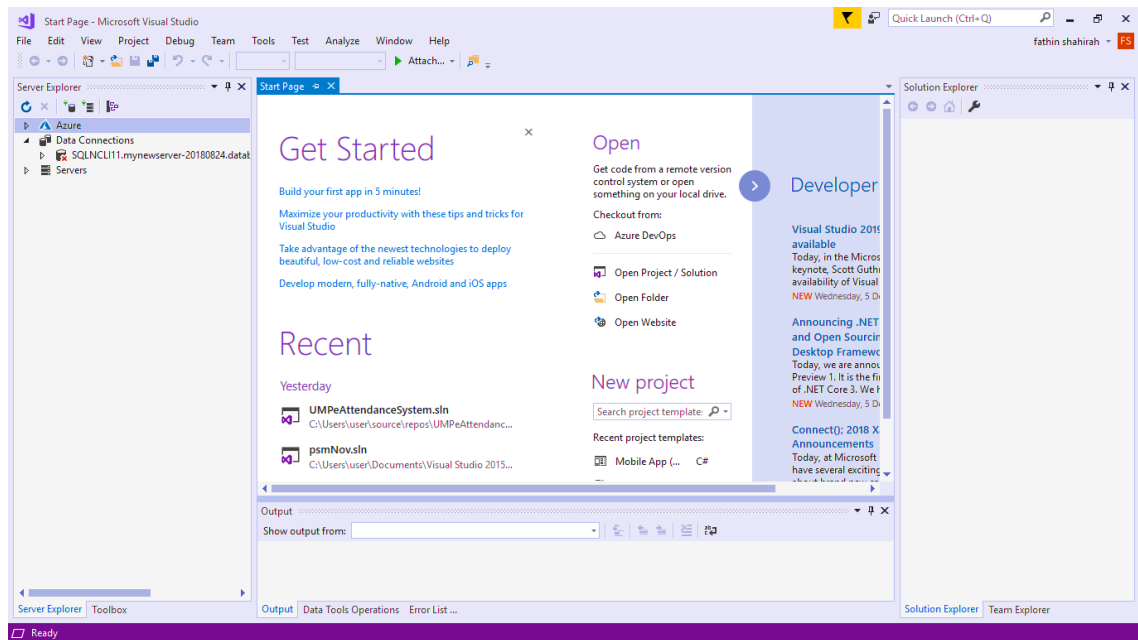


Figure 4.1 Microsoft Visual Studio 2017 Interface

4.2.1.1 Web Application Implementation

During the process of implementation of web application for this system, all interface of this application are design using ASP.NET language and it functions coded using C# language. This application develops starting with interfaces design for both user which are lecturer and admin. Microsoft Visual Studio 2017 is the best tools to design web application because it allows the developer to choose and drag all components from toolbox and drop it in the web form such as button, drop down list and text box.

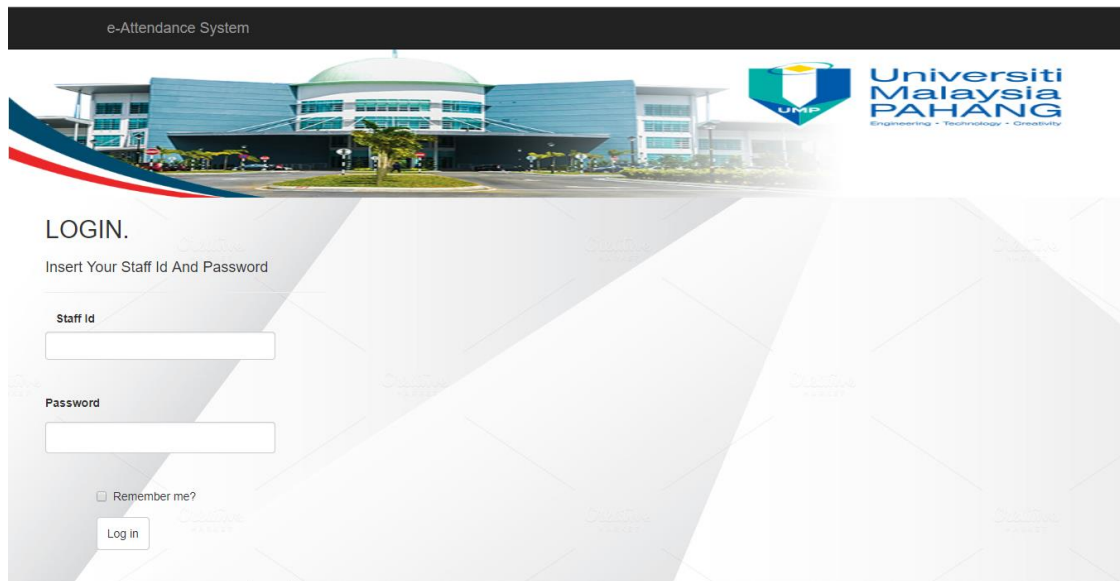


Figure 4.2 Login Interface for Admin and Lecturer

Figure 4.2 show the first interface of this system web application which is login interface. This is one of the examples of the implementation of Secure Student Attendance System Based on Geo-Location and QR Code Technologies using Microsoft Visual Studio 2017. This interface used by admin and lecturer to login by entering their staff id and password. After hit the Log In button, user that entered right staff id and password will redirect to the next interface which is Home interface.

```

conn.Open();

cmd = new SqlCommand("SELECT * from Staff WHERE Staff_id= @staffid AND Staff_password= @password", conn);

SqlParameter staffid = new SqlParameter("@staffid", SqlDbType.VarChar);
SqlParameter password = new SqlParameter("@password", SqlDbType.VarChar);

staffid.Value = StaffId.Text;
password.Value = Password.Text;
cmd.Parameters.Add(staffid);
cmd.Parameters.Add(password);
cmd.ExecuteNonQuery();
cmd.Connection = conn;
SqlDataReader myReader = cmd.ExecuteReader(CommandBehavior.CloseConnection);
if (myReader.Read() == true)
{
    Session["staffid"] = myReader["Staff_id"].ToString();
    Session["staffname"] = myReader["Staff_name"].ToString();
    Response.Redirect("Homestaff.aspx");
}

else if ((StaffId.Text == "admin") && (Password.Text == "admin123"))
{
    Session["admin"] = StaffId.Text;
    Response.Redirect("HomeAdmin.aspx");
}
else
{
    Page.ClientScript.RegisterStartupScript(this.GetType(), "popup", "alert('invalid User !!!');", true);
}
conn.Close();

```

Figure 4.3 Code for Login Page

Figure 4.3 shows the code behind the login process of this system. Admin id and password has been fixed by system developer while lecturer account registered by admin before they can login into this system. When user click “Log In” button, it will call “LogIn” function and the coding inside that function that shows in Figure 4.3 will execute.

Figure 4.4 Create New Class Interface

Before an attendance created, lecturer need to register their class into the system by insert class information such as subject name, section and student list as shown in Figure 4.4. After class successfully registered, lecturer will be redirect to the new attendance page as in Figure 4.5 to create attendance for the class. All class and attendance information will be saved into the database.

Figure 4.5 Create New Attendance Interface

```

string id = Label1.Text;
QRCodeGenerator qrGenerator = new QRCodeGenerator();
QRCodeData qrCode = qrGenerator.CreateQrCode(id, QRCodeGenerator.ECCLLevel.Q);
System.Web.UI.WebControls.Image imgBarcode = new System.Web.UI.WebControls.Image();
imgBarcode.Height = 250;
imgBarcode.Width = 250;
QRCode qrCodeData = new QRCode(qrCode);
using (Bitmap bitMap = qrCodeData.GetGraphic(20))
{
    using (MemoryStream ms = new MemoryStream())
    {
        bitMap.Save(ms, System.Drawing.Imaging.ImageFormat.Png);
        byte[] byteImage = ms.ToArray();
        imgBarcode.ImageUrl = "data:image/png;base64," + Convert.ToBase64String(byteImage);
    }
    PHQRCode.Controls.Add(imgBarcode);
}

```

Figure 4.6 Code of Generating QR Code

All of the attendance owns its own ID that use to generate QR code for that attendance using code as shown in Figure 4.6. Figure 4.7 shows the example of QR code that save the attendance ID. Lecturer can choose either to display directly from this system either to download the QR code.

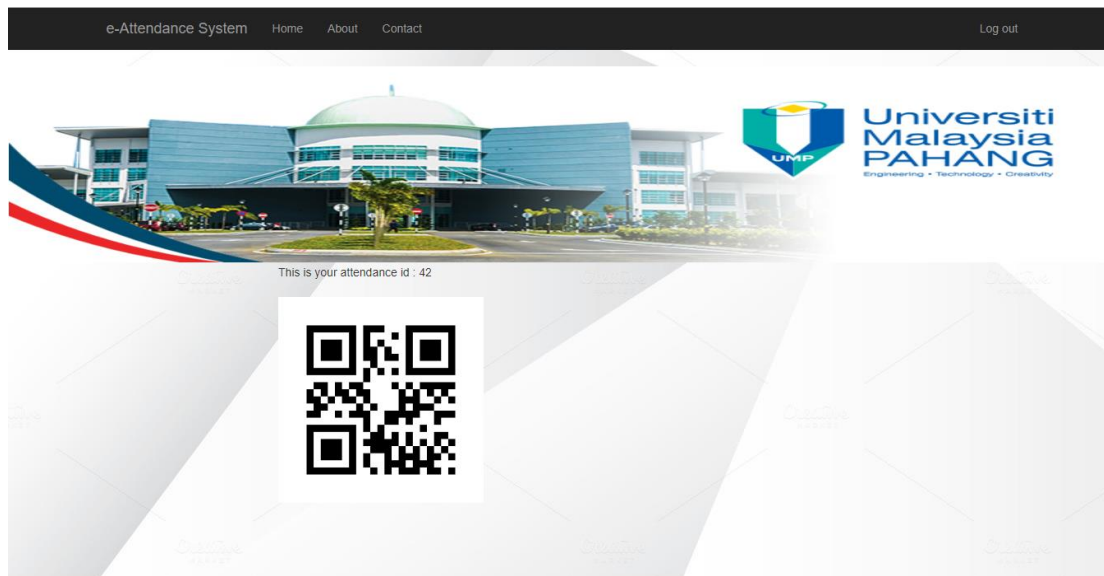


Figure 4.7 Example of QR Code for Attendance

Figure 4.8 below shows the example of the attendance list that can be view by lecturer based on selected date and class. All attendance information will be displayed including student attendance status.

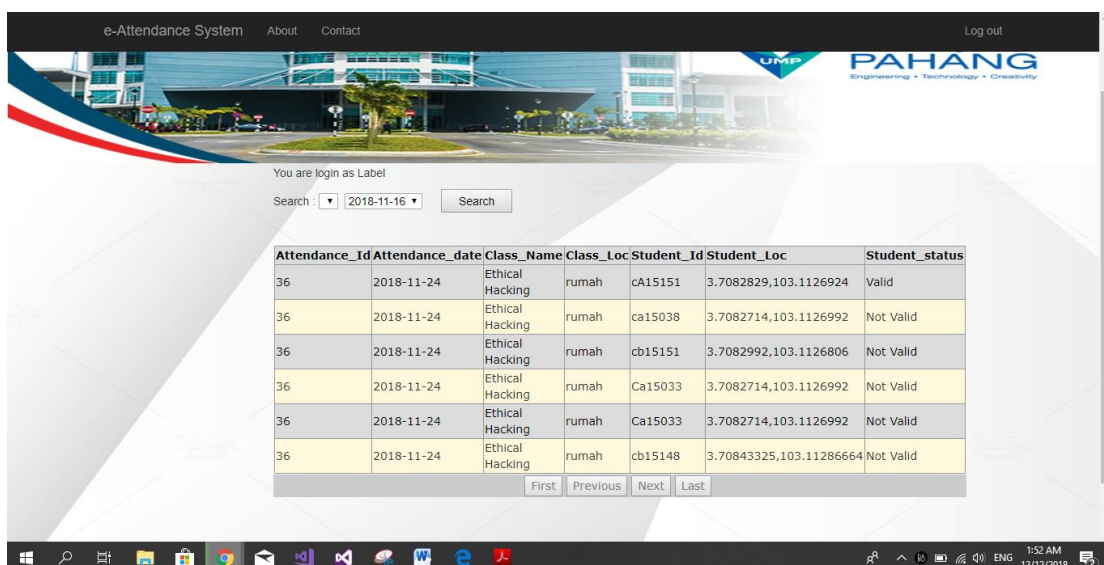


Figure 4.8 Example of List Attendance

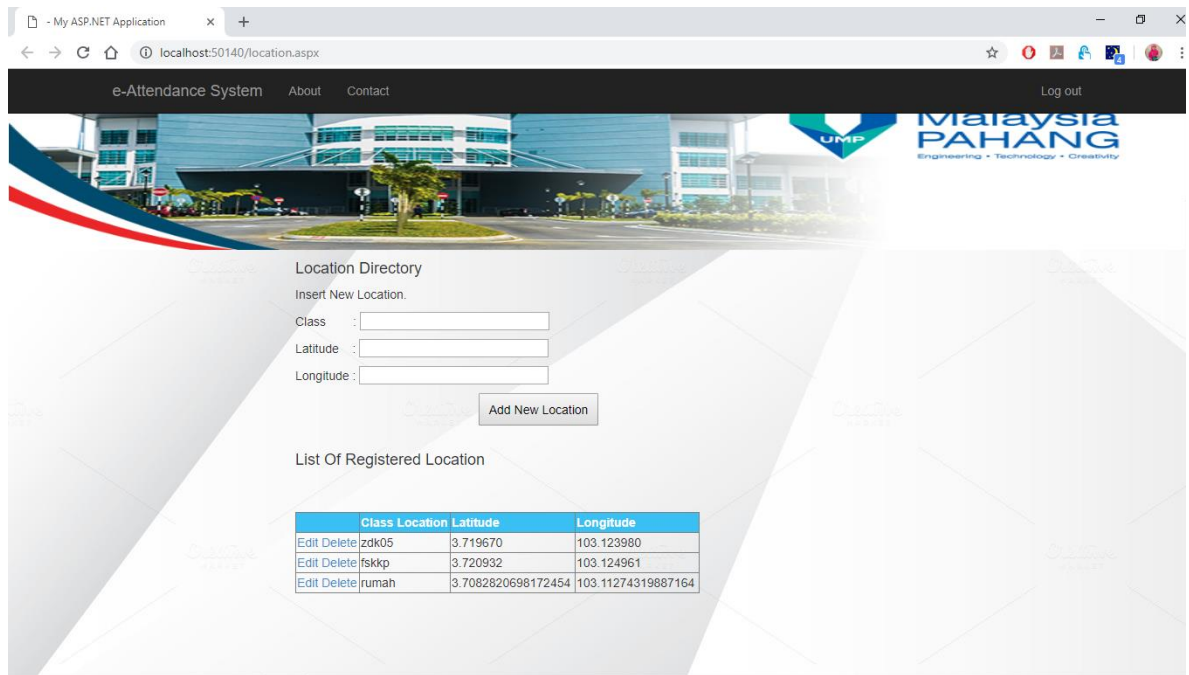


Figure 4.9 Update Location Interface

For implementation of geo-location into this Secure Student Attendance System Based on Geo-Location and QR Code Technologies, admin need to insert coordinate of all classrooms in Universiti Malaysia Pahang. As shown in Figure 4.9 This coordinate is used to calculate the distance that will explain in details in Section 4.2.2.

4.2.1.2 Mobile Application Implementation

For implementation of mobile application for this system, it is used by student to scan the QR code and check in the attendance based on class information. This application designed using Microsoft Visual Studio 2017 with Xamarin using C# language. Xamarin is Microsoft product that used to create native apps for Android, IOS and Windows that shared the same code that scripted using C# language.

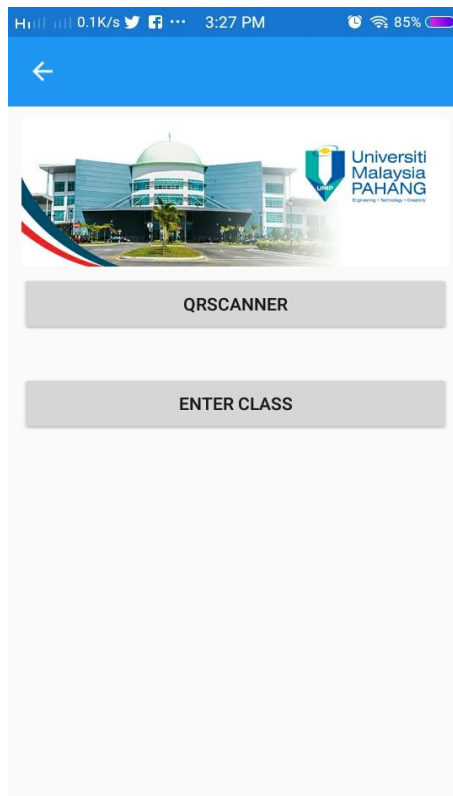


Figure 4.10 Main Interface

Figure 4.10 shows the main interface of this system mobile application after students enter this system. Student need to scan the QR code before enter the class as shown in Figure 4.11.

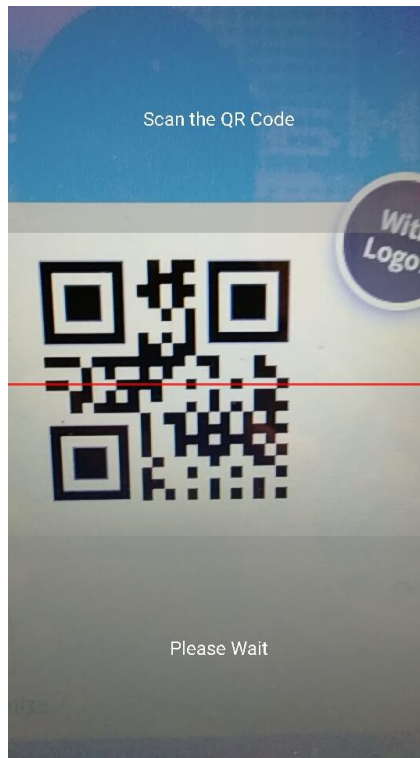


Figure 4.11 QR Code Scanner Interface

```
public async void btnScan_Clicked(object sender, EventArgs e)
{
    try
    {
        var scanner = DependencyService.Get<IQrScanningService>();
        var result = await scanner.ScanAsync();
        if (result != null)
        {
            attend.Text = result;
        }
    }
    catch (Exception ex)
    {
        throw;
    }
}
```

Figure 4.12 Code of QR Code Scanner

Figure 4.12 shows the code that used to read data from QR code when the scanner scans the QR code.

Class Information

Attendance Id :
1

Date :
22/10/2018

ClassName :
Programming

Section :
02A

Class Location :
zdk05

Staff Id:
zamri

Student Id :
cb15011

SUBMIT

Figure 4.13 Checkin Interface of Secure Student Attendance application

After read the attendance id from QR Code, student need to insert their student id to complete their check in of the attendance completed as shown in Figure 4.13. .Message box as shown Figure 4.14 will be appear to confirm all attendance information successfully stored in database.

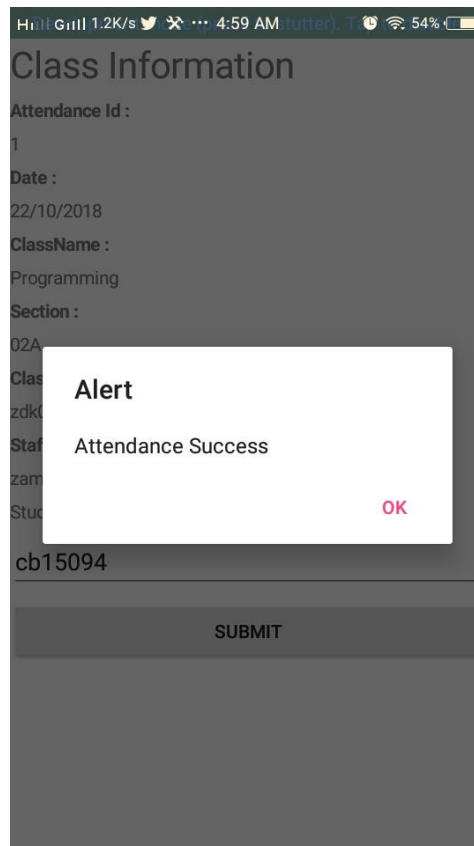


Figure 4.14 Attendance Status Alert

4.2.2 Geo-Location Implementation

This section will explain in detail the implementation of geo-location technology in this Secure Student Attendance System Based on Geo-Location and QR Code Technologies. This technology is implemented in mobile application to detect real time coordinate of the device using geo locator plugin in this system as shown in Figure 4.15.

```
using Xamarin.Forms;
using Xamarin.Forms.Xaml;
using UMPeAttendanceSystem.Interface;
using Plugin.Geolocator;
using System.Diagnostics;
using System.Data;
using System.Data.SqlClient;
```

Figure 4.15 Plugin of Geo-Locator

For this system, this implementation working behind the Checkin page in mobile application shows in Figure 4.13. After user hit the submit button, their current coordinate automatically saved in database and compared with the class location that has been set by lecturer.

```
string location = DependencyService.Get<IIpAddressManager>().GetIpAddress();
var locator = CrossGeolocator.Current;

var position = await locator.GetPositionAsync(TimeSpan.FromSeconds(10));

//Debug.WriteLine("Position Status: {0}", position.Timestamp);
Debug.WriteLine("Position Latitude: {0}", position.Latitude);
Debug.WriteLine("Position Longitude: {0}", position.Longitude);

double lat = position.Latitude;
double longi = position.Longitude;
```

Figure 4.16 Code of Device Locator

Figure 4.16 shows the code works behind the process of getting device location. This code worked as the user click “submit” button. After getting the device coordinate, the latitude and longitude of the device will be compared with coordinate of the class to make sure attendance of the students are valid or vice versa. This system has been set based on client requirement where the valid attendance of student measured by the distance between location of the device and location of the class. The distance must less than 50 metre. The calculation of the distance showed in Figure 4.17.


```

double lat2 = Convert.ToDouble(dr["latitude"]);
double longi2 = Convert.ToDouble(dr["longitude"]);
double lat1 = lat;
double longi1 = longi;
double dist = 0;
if ((lat1 == lat2) && (longi1 == longi2))
{
    dist = 0;
}
else
{
    double theta = longi1 - longi2;
    dist = Math.Sin(deg2rad(lat1)) * Math.Sin(deg2rad(lat2)) + Math.Cos(deg2rad(lat1)) * Math.Cos(deg2rad(lat2)) * Math.Cos(deg2rad(theta));
    dist = Math.Acos(dist);
    dist = rad2deg(dist);
    dist = dist * 60 * 1.1515;
    dist = dist * 1609.34;
}
return dist;
}
private double deg2rad(double deg)
{
    return (deg * Math.PI / 180.0);
}
private double rad2deg(double rad)
{
    return (rad / Math.PI * 180.0);
}
public string StatusStud(double dis)
{
    string result;
    if (dis > 50.00)
    {
        result = "Not Valid";
    }
    else
    {
        result = "Valid";
    }
}
}

```

Figure 4.17 Code of Distance Calculation

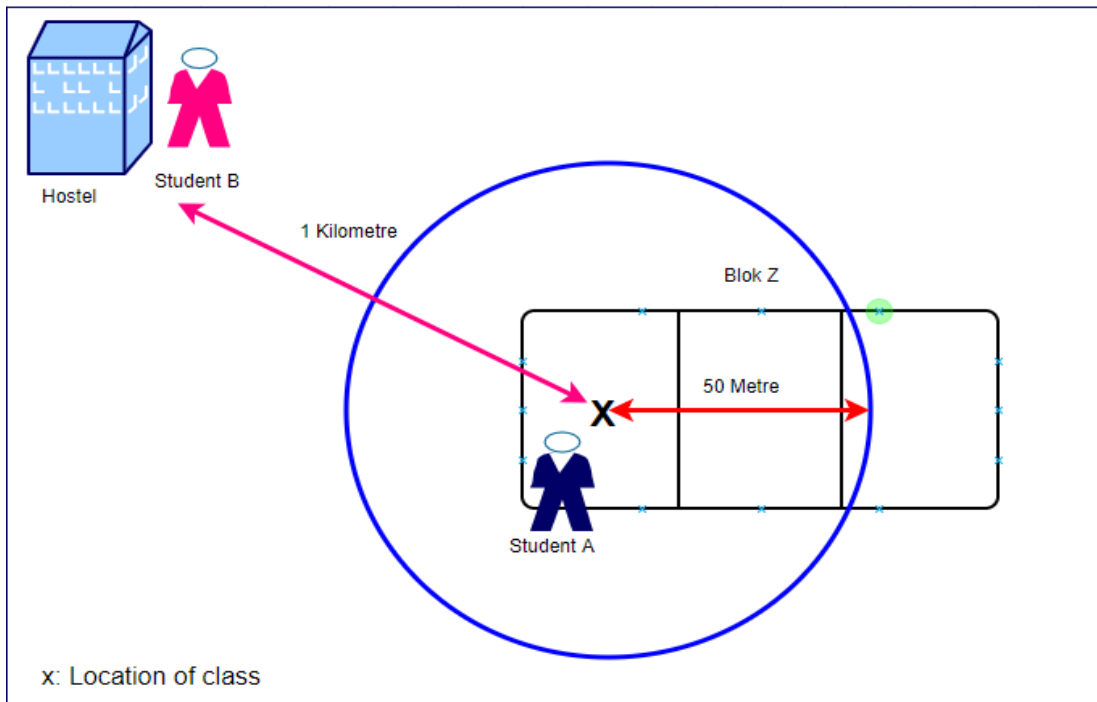


Figure 4.18 Example of Attendance Scenario

Example of the scenario in Figure 4.18 shows two different students at different location. Both of them successfully check in the attendance but with different status. Student A check in the attendance with valid status while student B check in the attendance with invalid status. This difference occurred based on the distance of the student when they hit the submit button.

This system has been set the maximum distance between mobile device and class within 50 metre only. Student B check in into the class from his hostel where located 1000 metre from the class location where his distance over the maximum distance set up by this system while student A hit the submit button inside the class area as shown in Figure 4.18

4.2.3 Database Implementation

Microsoft Azure is used as online database for this Secure Student Attendance System Based on Geo-Location and QR Code Technologies. Azure SQL databases are cloud database service that fully managed database of this system to maintain the security of data. Connection of this system with Azure database required internet connection for this system.

Figure 4.19 shows list of table in this database used for this system. For this Secure Student Attendance System Based on Geo-Location and QR Code Technologies, Azure SQL Database named as mySampleDatabase using SQL server named as mynews server-20180824.database.windows.net. .

There are six tables designed in this database which are attendclass, Attendance, Class, location, Staff and studentlist. Database query such as insert, delete and select statement are used to make connection between this system and Azure SQL database.

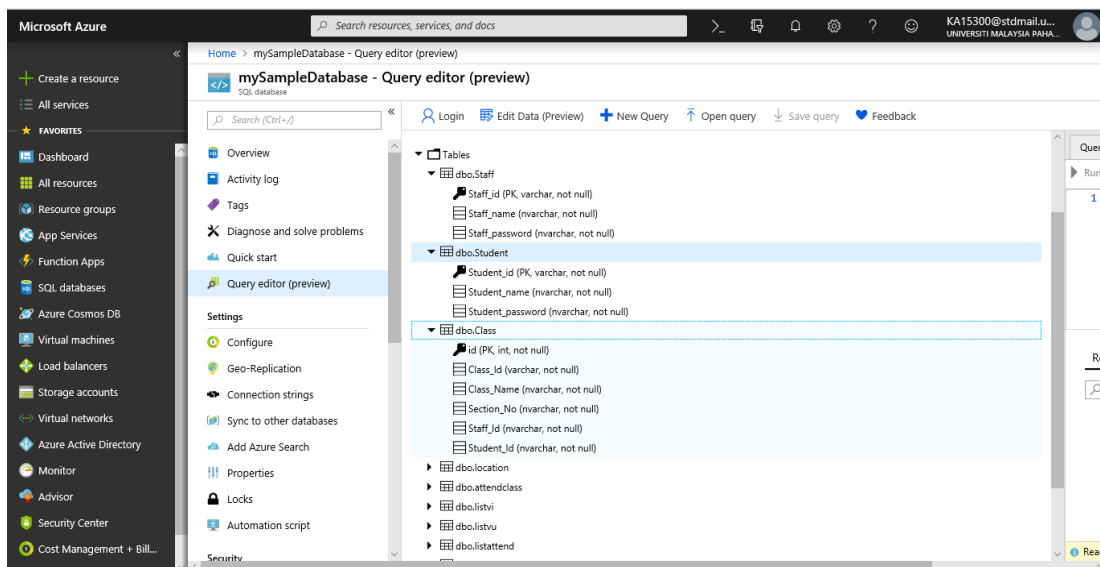


Figure 4.19 Microsoft Azure SQL Database

```

ur = uc.newrow(),
SqlCommand cmd = new SqlCommand();

String conn = @"Data Source=mynewserver-20180824.database.windows.net;Initial Catalog=mySampleDatabase;Integrated Security=False;
User ID=ServerAdmin;Password=Fathin1996;Connect Timeout=260;Encrypt=True;TrustServerCertificate=False;
ApplicationIntent=ReadWrite;MultiSubnetFailover=False";
SqlConnection scon = new SqlConnection(conn);

```

Figure 4.20 Connection for Database Query

In addition, Figure 4.20 shows the connection string used to connect system database into the Azure SQL server databases. After connection string successfully establish, INSERT statement is one of the example of query where the data of the student attendance will insert into database as in Figure 4.21

```

cmd = new SqlCommand("INSERT INTO Attendance (Attendance_Id,Attendance_date,Class_Name,Class_Loc,Staff_Id,Student_Id,Student_Loc,Student_status) " +
"VALUES ( @id, @classdate,@classname @classloc, @staff, @student, @studloc, @status)", conn);
cmd.Parameters.AddWithValue("@id", attendno);
cmd.Parameters.AddWithValue("@classdate", classdate);
cmd.Parameters.AddWithValue("@classname", nameclass);
cmd.Parameters.AddWithValue("@classloc", loc);
cmd.Parameters.AddWithValue("@staff", staffid);
cmd.Parameters.AddWithValue("@student", studid);
cmd.Parameters.AddWithValue("@studloc", lat + "," + longi);
cmd.Parameters.AddWithValue("@status", result);
cmd.ExecuteNonQuery();
await DisplayAlert("Alert", "Attendance Success", "OK");

```

Figure 4.21 Insert Details into Database Query

4.3 Testing Technique

This section will review about the testing process for Secure Student Attendance System Based on QR Code Technologies at Universiti Malaysia Pahang. Functional testing is implemented to test all functions stated in the designed test cases. During this testing, all corrections were made immediately after the testing if they are any error found.

4.3.1 Functional Testing

Functional testing is one of the software testing where the web application and mobile application is tested necessitated from requirement specification by client. From this testis, any incomplete requirement can be traced immediately. This testing normally starting from the early of software development life cycle. All functions are tested by entering input and examining the output.

This type of testing is using black box testing techniques. Clients only can see the system can process input data successfully until it displays the expected output without knowing the specific programming designed for processing the data.

4.3.2 Testing Report

For this project, User Acceptance Test (UAT) document has been created and attached in Appendix D where the entire test cases of this system are documented as a testing guideline. This system needs to follow the guideline stated in this UAT document such as scenario, input data, expected result, actual result, and the function status either pass or fail.

4.4 Summary

The implementation of Secure Student Attendance System Based on Geo-Location and QR Code Technologies is done by using Microsoft Visual Studio 2017. Besides, geo-location implementation is also described in detail in this chapter. Android mobile is chosen for the implementation environment of mobile application of this system. Then, Microsoft Azure is used as an online database where all the data is stored. Other than that, black box testing has been determined as a testing technique used to test this system's functionality.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter is summarization of Secure Student Attendance System Based on Geo-Location and QR Code Technologies. In this chapter, project constraints and recommendation of future project are pointed out. This system is developed for university and college students especially for Universiti Malaysia Pahang as one of the effort to upgrade the current attendance system so that it will be more secure. Student location will be detected automatically when they check in the attendance of that class to make sure they come to the class.

5.2 Project Constraint

This Secure Student Attendance System Based on Geo-Location and QR Code Technologies has a few constraints that need some improvement in future.

- a) Admin need to insert the coordinate of new class location manually
- b) Student can insert their friend id using same devices,
- c) Student cannot view the attendance that they already checked in

5.3 Recommendation and Future Work

There are few recommendations for future project of this student attendance system that needs to be upgrade to make this system easier for all of the users and provide better features. In future, admin can insert location automatically by searching coordinate using address. Next, this system can detect the IP address of the device to avoid students from check in the attendance for their friend. Last but not least, functions for student to view all of the attendances that they already checked in can be added.

5.4 Closing Note

In this chapter, the development of Secure Student Attendance System Based on Geo-Location and QR Code Technologies is concluded. Before development process started, process getting and analyses all requirements from client are made. Based on the analysis of requirement, system model are designed by preparing System Design Document (SDD) as attached in Appendix C.

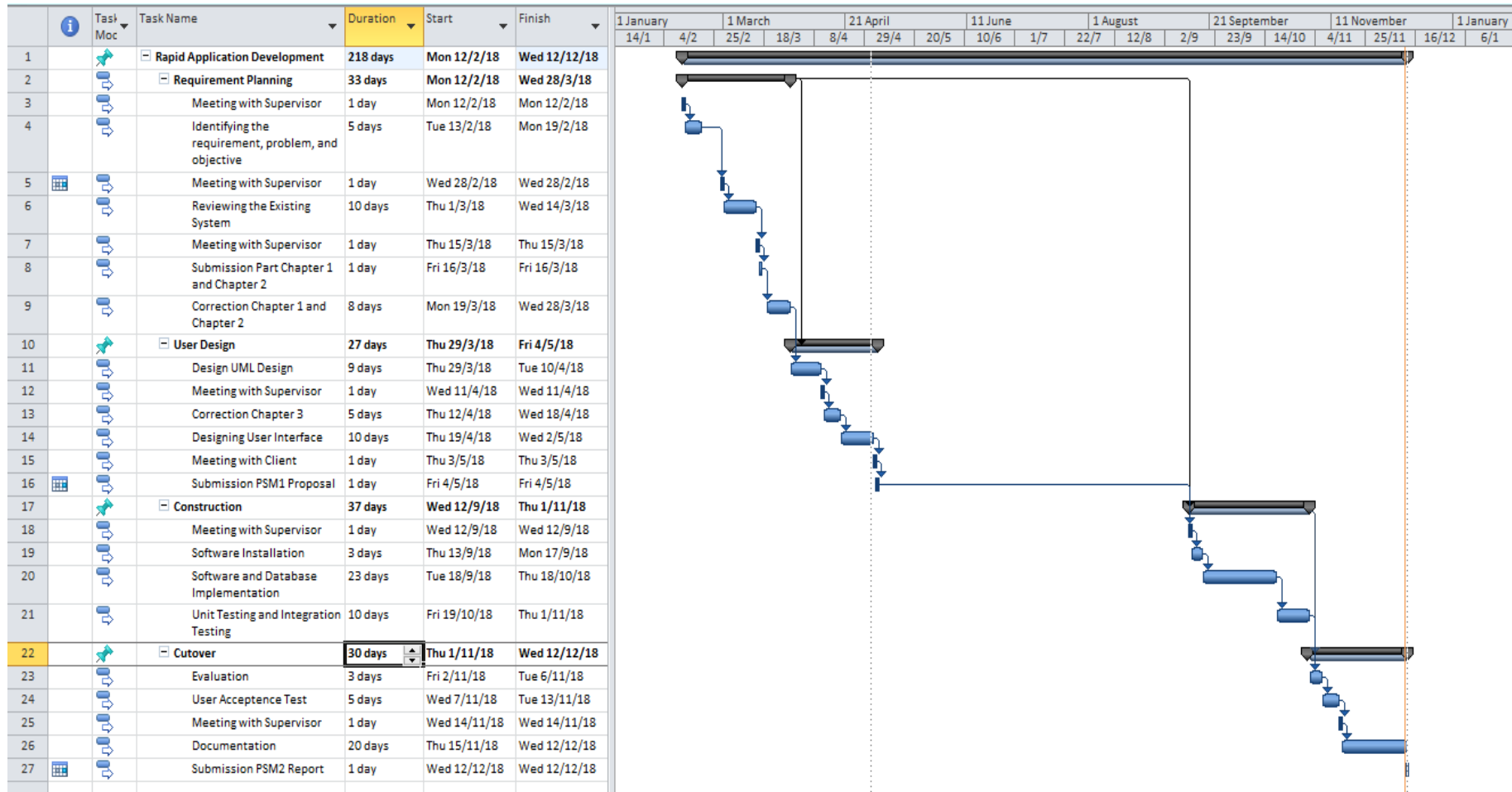
Next, the development process started and prototype of Secure Student Attendance System Based on Geo-Location and QR Code Technologies was done. After development process finished, testing process was continuously conducted based on User Acceptance Test (UAT) by client. UAT was approved by client based on the needed functionality.

Finally, project constraint of this system and recommendation for future work were proposed to improve this Secure Student Attendance System Based on Geo-Location and QR Code Technologies performance.

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APPENDIX A GANTT CHART



APPENDIX B
SOFTWARE REQUIREMENT SPECIFICATION (SRS)

APPENDIX B
SOFTWARE REQUIREMENT
SPECIFICATION (SRS)

**APPENDIX C
SOFTWARE DESIGN DOCUMENT (SDD)**

**APPENDIX C
SOFTWARE DESIGN DOCUMENT
(SDD)**

**APPENDIX D
USER ACCEPTANCE TEST (UAT)**

**APPENDIX D
USER ACCEPTANCE TEST
(UAT)**

APPENDIX B

SOFTWARE

REQUIREMENT

SPECIFICATION (SRS)

SOFTWARE REQUIREMENT SPECIFICATION (SRS)

SECURE STUDENT ATTENDANCE SYSTEM USING GEO LOCATION AND QR CODE TECHNOLOGIES

**Faculty of Computer Systems & Software
Engineering (FSKKP)**

1.0 FUNCTIONS

Below are the proposed functions Secure Student Attendance System Based on Geo-Location and QR Code Technologies explained in the Table 1.1.

Table 1.1: Functions of the Secure Student Attendance System Based on Geo-Location and QR Code Technologies

FUNCTION	DESCRIPTION
Login	All users of the system need to login into the system.
Register	Admin will register the new staff into this system
Scan QR Code	Smartphone with this application are used to scan the QR Code by students.
Update location	Admin is authorized to update the new class location if needed
Add Class	Lecturer as the user can add new class into the system.
Create Attendance	Lecturer as the user can create new attendance after class has been created
View Attendance List	View the attendance that has been created and user can search and update the list.

View Class List	View the class that has been created by lecturer and lecturer can search and update the list. Admin also can view all class registered in this system
View Staff List	Admin can view all the staff registered in this system

2.0 DATA FLOW DIAGRAM LEVEL 0 (DFD LEVEL 0)

Below is the data flow diagram level 0 of the QR Code-Based Student Attendance System explained in Figure 2.1 .

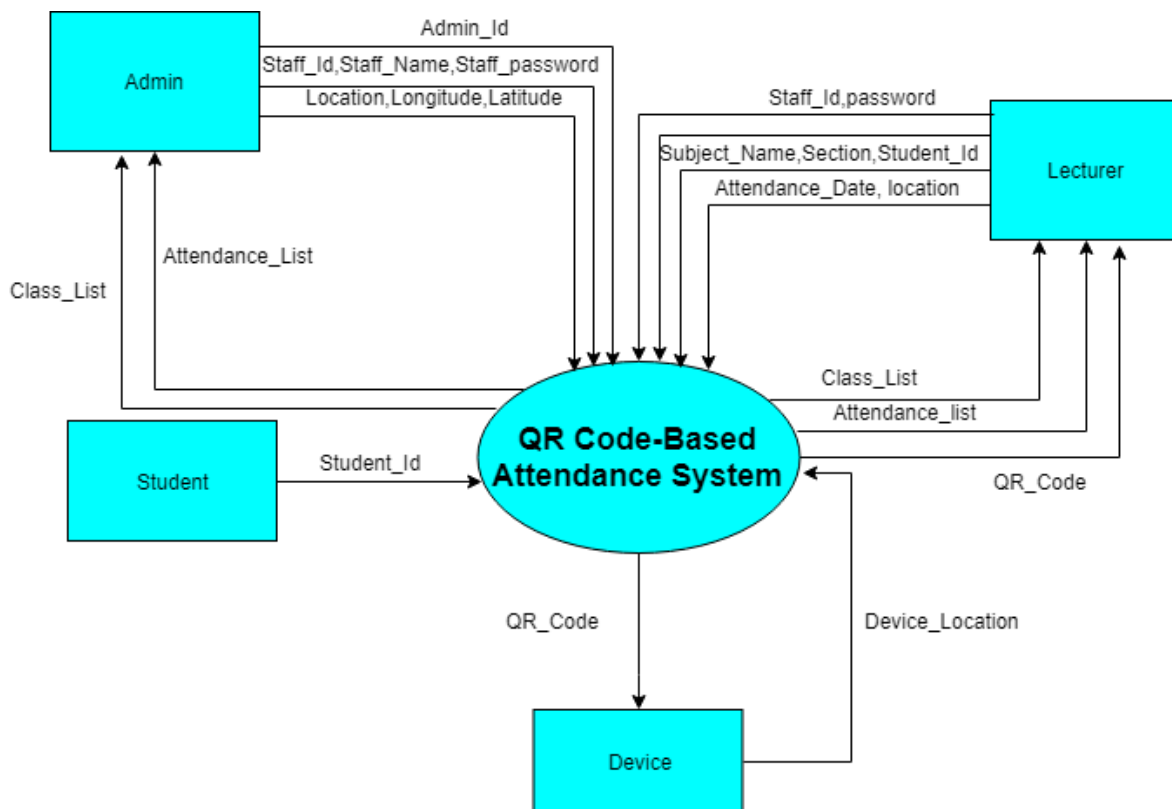


Figure 1.2.1 : Data Flow Diagram Level 0 of Secure Student Attendance System Based on Geo-Location and QR Code Technologies

3.0 DATA FLOW DIAGRAM LEVEL 1

Below is the figure of data flow diagram level 1 for Secure Student Attendance System Based on Geo-Location and QR Code Technologies. It contains eight modules which are register module, login module, manage QR code module, view attendance status module, add class module, create attendance module and view attendance list module.

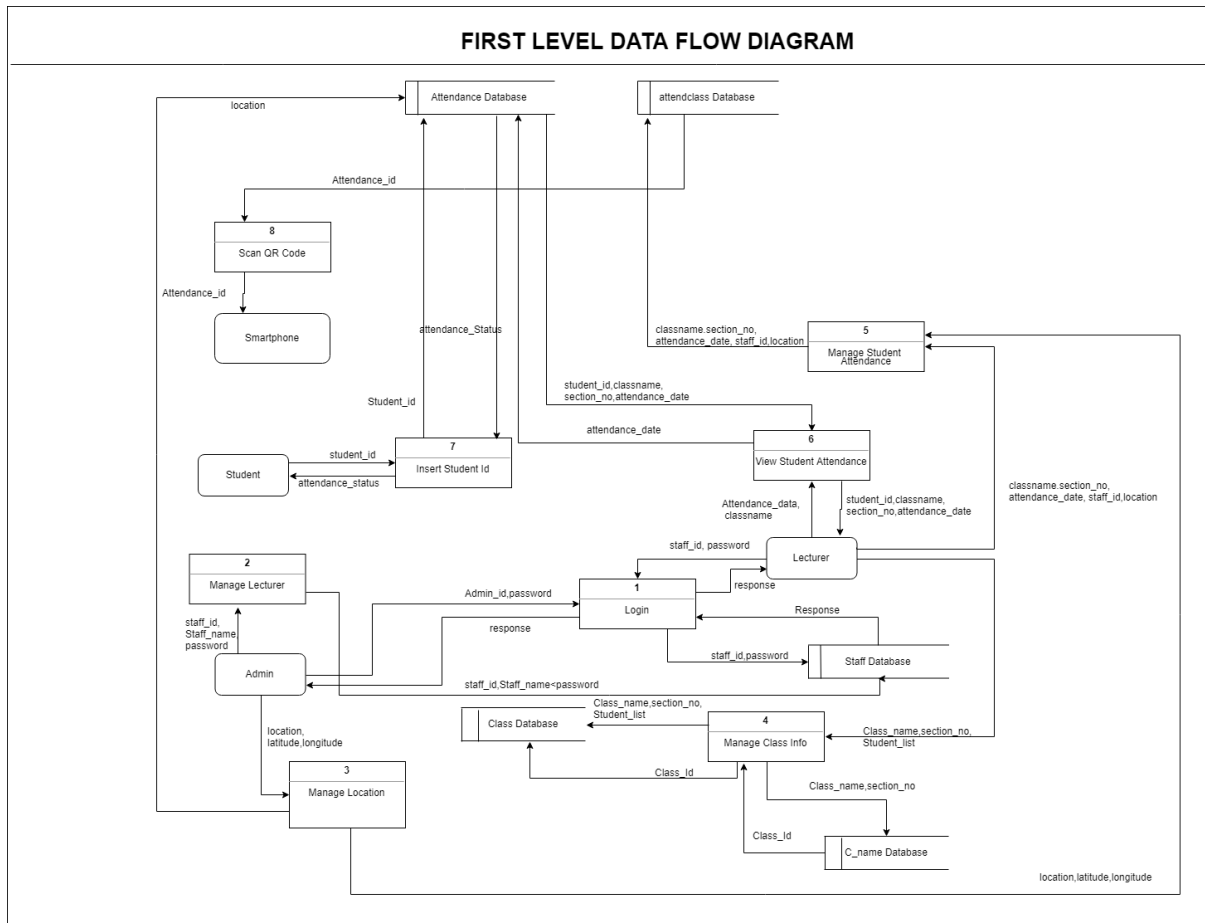


Figure 1.3.1 : Data Flow Diagram Level 1 of Secure Student Attendance System Based on Geo-Location and QR Code Technologies

4.0 STRUCTURED ENGLISH

Login Module

```
Insert id, Password
SEEK Id, Password in staff_database files
IF Id, Password found THEN
DISPLAY "Success"
ELSE
DISPLAY "Wrong id or password"
ENDIF
```

Manage Location Module

```
Insert location, latitude, longitude
SEEK location,latitude,longitude in location database files
DISPLAY location,latitude,longitude
```

Manage Lecturer Module

```
Insert staff_id,staff_name,staff_password
SEEK staff_id,staff_name,staff_password in Staff database files
IF class_name,section_no NOT found THEN
DISPLAY "Success"
ELSE
DISPLAY error message
ENDIF
```

Manage Class Info Module

```
Insert classname, staff_id,section_no,student_id
SEEK staff_id,staff_name,staff_password in Staff database files
IF class_name,section_no NOT found THEN
```

```
DISPLAY "Success"  
ELSE  
DISPLAY error message  
ENDIF
```

Manage Student Attendance Module

```
INSERT classname,attendance_date,class_loc,staff_id  
SEEK classname,attendance_date,class_loc,staff_id in Attendance table database  
DISPLAY classname,attendance_date,class_loc,staff_id
```

Insert Student Id Module

```
INSERT student_id  
SEEK student_id,classname,attendance_date,student_loc,class_loc,student_status in  
Attendance table database  
IF success  
DISPLAY "SUCCESS"  
ELSE  
DISPLAY error
```

Scan QR Code Module

```
SELECT attendance_id  
SEEK attendance_id,attendance_date,classname,staffed,classloc in attendclass table database  
SELECT class_name, section_no, class_location, attend_date  
DISPLAY qr code
```

View Attendance List Module

```
SELECT class_name, section_no attend_date,student_id,student_status,classloc  
SEEK class_name, section_no attend_date,student_id,student_status,class_loc in  
attendance.database files  
DISPLAY student_id, CheckIn_time, student_location
```

5.0 DATA MODELLING

Below is the entity relationship diagram of Secure Student Attendance System Based on Geo-Location and QR Code Technologies. The relationship of data explained in Figure 1.3

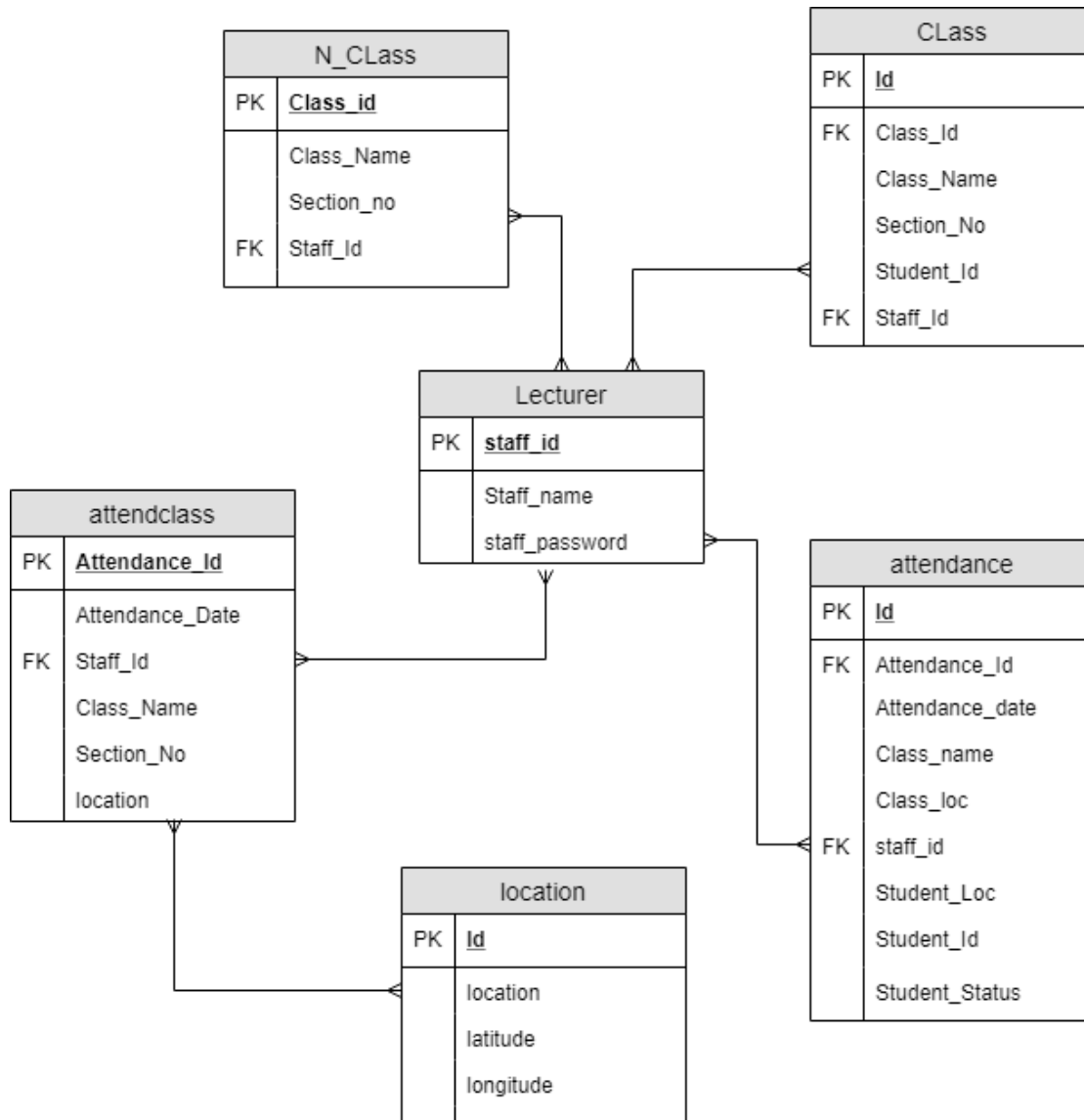


Figure 1.1 Entity Relationship Diagram of Secure Student Attendance System Based on Geo-Location and QR Code Technologies

5.0 SYSTEM REQUIREMENTS APPROVAL

	Name	Date
Verified by:	NOOR FATHIN SHAHIRAH BINTI AHMAT	1 st April 2018
Developer		
Approved by:		1 st April 2018
Client		

SOFTWARE DESIGN DOCUMENT (SDD)

SECURE STUDENT ATTENDANCE SYSTEM BASED ON GEO-LOCATION AND QR CODE TECHNOLOGIES

**Faculty of Computer Systems & Software
Engineering (FSKKP)**

1.0 DATA DICTIONARY

Table Name: Staff

Field Name	Data Type	Primary Key	Constrains	Description
Staff_id	Varchar (25)	Yes	NOT NULL	Store the staff_id that use for lecturer to login and create attendance.
Staff_password	Varchar (20)	No	NOT NULL	Stores the password specified by the lecturer that required for login.
Staff_name	Varchar (20)	No	NOT NULL	Store the staff name that parallel with staff_id

Figure 1.1: Data Dictionary of Staff Table for Secure Student Attendance System Based on Geo-Location and QR Code Technologies

Table Name : Class

Field Name	Data Type	Primary Key	Constrains	Description
Id	Int	Yes	NOT NULL	Identity with auto increment for the class table.
Class_Id	Int	No	NOT NULL	Primary key from registerclass table.
Class_name	Varchar (20)	No	NOT NULL	Name for the class that created.
Section_no	Varchar (20)	No	NOT NULL	Number of the section for the class
Staff_id	Varchar (25)	No	NOT NULL	Attribute that identify the lecturer for the class. Refer to lecturer table
Student_id	Varchar (25)	No	NOT NULL	Attribute that identify the student of that class. Refer to student table.

Figure 1.2 :Data Dictionary of Class Table for Secure Student Attendance System Based on Geo-Location and QR Code Technologies

Table Name : N_class

Field Name	Data Type	Primary Key	Constrains	Description
Class_Id	Int	No	NOT NULL	Identity with auto increment for the class that has been created by the lecturer
Class_name	Varchar (20)	No	NOT NULL	Name for the class that created.
Section_no	Varchar (20)	No	NOT NULL	Number of the section for the class
Staff_id	Varchar (25)	No	NOT NULL	Attribute that identify the lecturer for the class. Refer to lecturer table

Figure 1.3 :Data Dictionary of N_Class Table for Secure Student Attendance System Based on Geo-Location and QR Code Technologies

Table Name: Attendance

Field Name	Data Type	Primary Key	Constrains	Description
Id	Int	Yes	NOT NULL	Attribute that uniquely identify the attendance table
Attendance_id	Varchar (25)	No	NOT NULL	Foreign Key from attendclass table.
Attendance_date	Date	No	NOT NULL	Date for the attendance
Class_Name	Varchar (20)	No	NOT NULL	Id of the class of that attendance get from class table
Class_Loc	Varchar (25)	No	NOT NULL	Location of the class registered in class table
Student_Loc	Varchar (50)	No	NOT NULL	Location of the attendance QR code scanned.
Student_Id	Varchar(25)	No	NOT NULL	Student id for the student that check in the attendance
Staff_id	Varchar (25)	No	NOT NULL	Staff id for the staff that manage the attendance
Student_status	Varchar(50)	No	NOT NULL	Status of the attendance

Figure 1.4 : Data Dictionary of Attendance Table for Secure Student Attendance System Based on Geo-Location and QR Code Technologies

Table Name: attendclass

Field Name	Data Type	Primary Key	Constrains	Description
Attendance_Id	Int	Yes	NOT NULL	Attribute that uniquely identify the attendance table
Attendance_date	Date	No	NOT NULL	Date for the attendance
Class_Name	Varchar (20)	No	NOT NULL	Name of the class for the attendance
location	Varchar (25)	No	NOT NULL	Location of the class
Section_No	Varchar (50)	No	NOT NULL	Section number of the class.
Staff_id	Varchar (25)	No	NOT NULL	Staff id for the staff that manage the attendance

Figure 1.5 : Data Dictionary of attend_class Table for Secure Student Attendance System Based on Geo-Location and QR Code Technologies

Table Name:location

Field Name	Data Type	Primary Key	Constrains	Description
Id	Varchar (25)	Yes	NOT NULL	Unique identification for location table.
location	Varchar (20)	No	NOT NULL	Location of all class
longitude	Varchar (20)	No	NOT NULL	Longitude of the location
Latitude	Varchar(20)	No	NOT NULL	Latitude of the location

Figure 1.6: Data Dictionary of locationTable for Secure Student Attendance System Based on Geo-Location and QR Code Technologies

2.0 SYSTEM INTERFACES

Figure 2.1 shows the interface of login page. This login page is the main page when the lecturer and admin open this system. They can login to the system by entering staff and password.

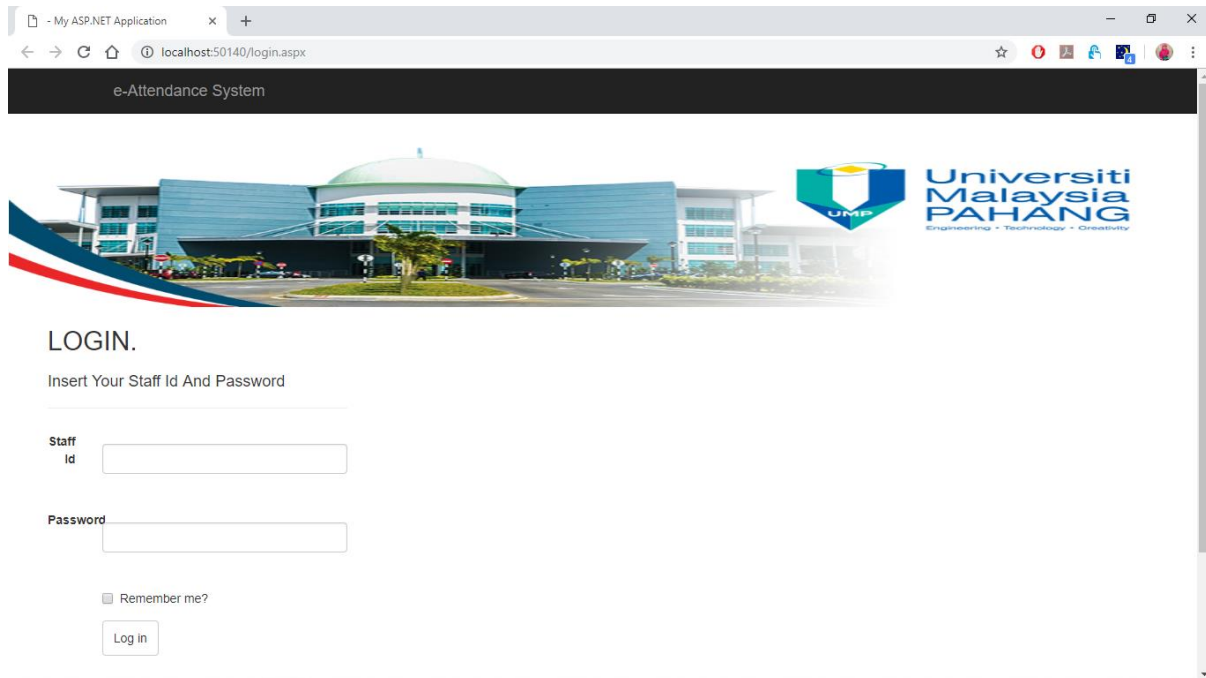


Figure 2.1 : Interface of Login

Figure 2.2 show the homepage of lecturer view. Lecturer can choose either to create new class, new attendance, view class list or view attendance list. When the user click button "Create New Class", they will be redirect to new class interface . Figure 2.3 show the interface of new class. Lecturer need to fill some data to create new class.

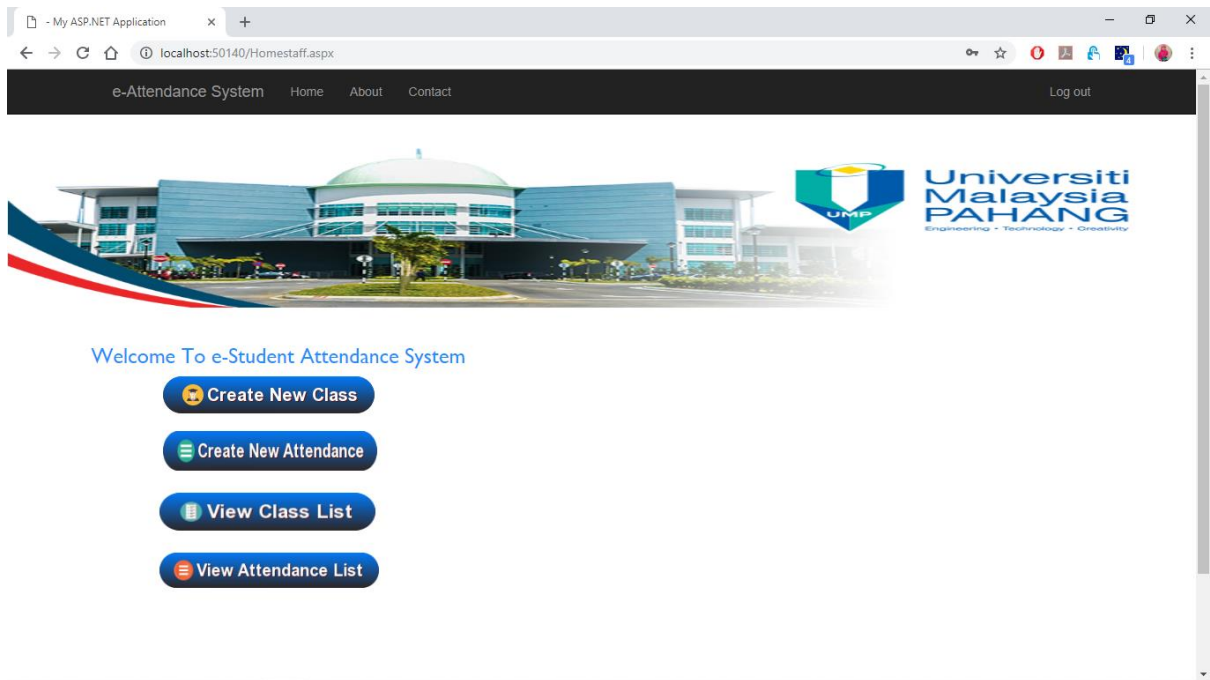


Figure 2.2 : Interface of Home Page of the lecturer view

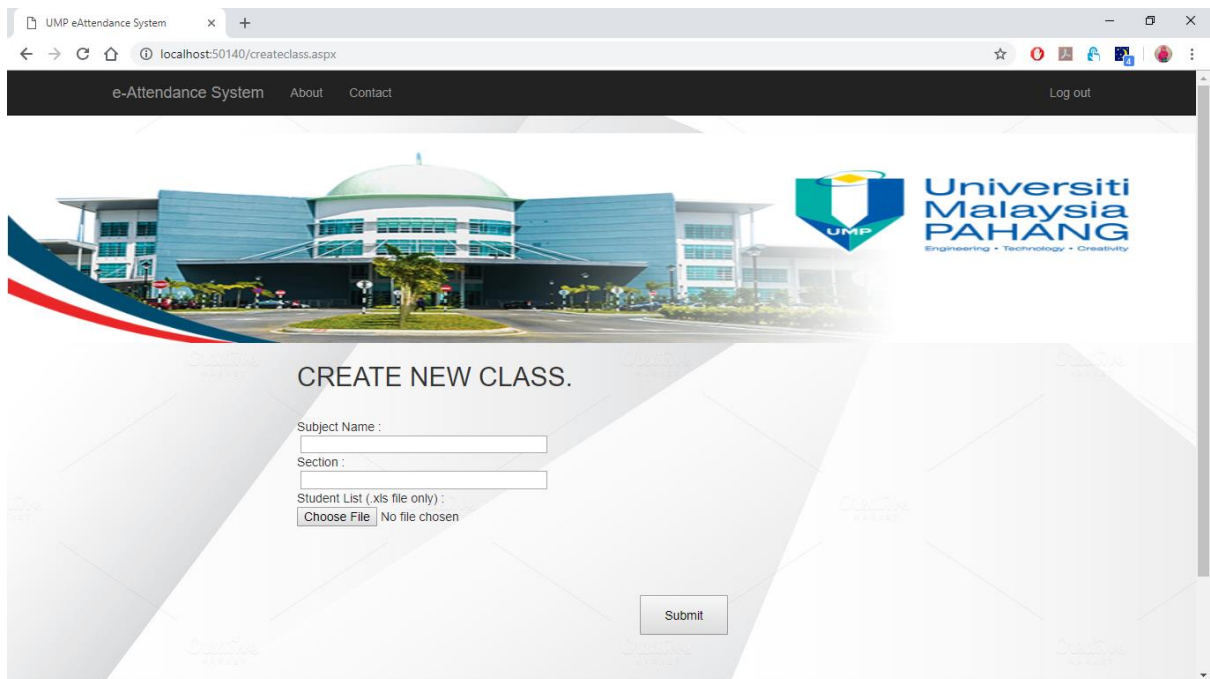


Figure 2.3 : Interface of New Class

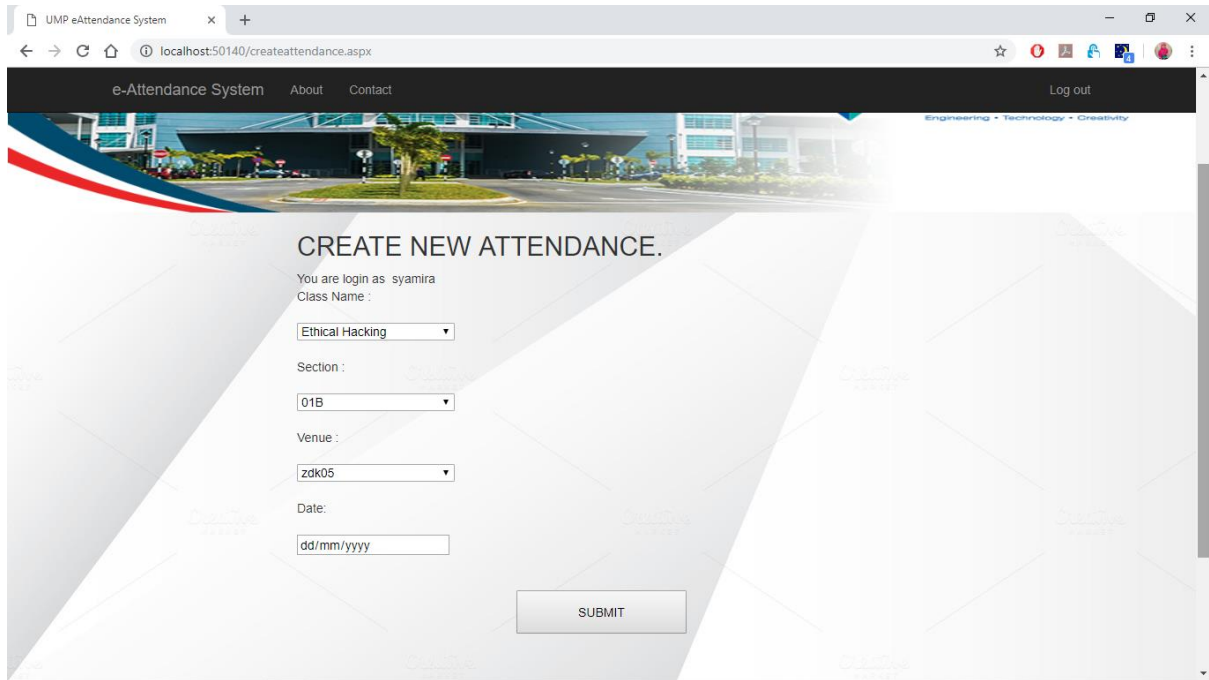


Figure 2.3 : Interface of Create New Attendance

Figure 2.3 below shows the interface of create attendance. Lecturer will be redirect into this page after they click “Create New Attendance” button in Home Page of the lecturer view. After completed the create attendance form, lecturer will redirect to new page to view the QR code generated based on the attendance details as shown in Figure 2.4.

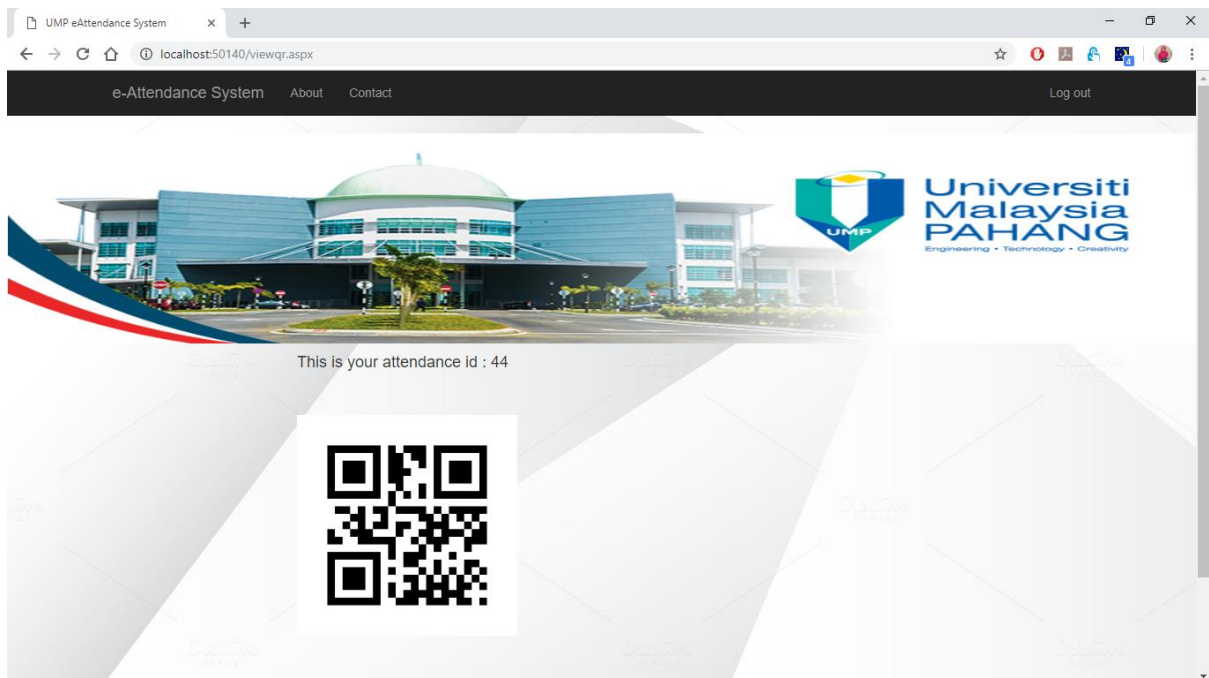


Figure 2.4 : Interface of QR Code

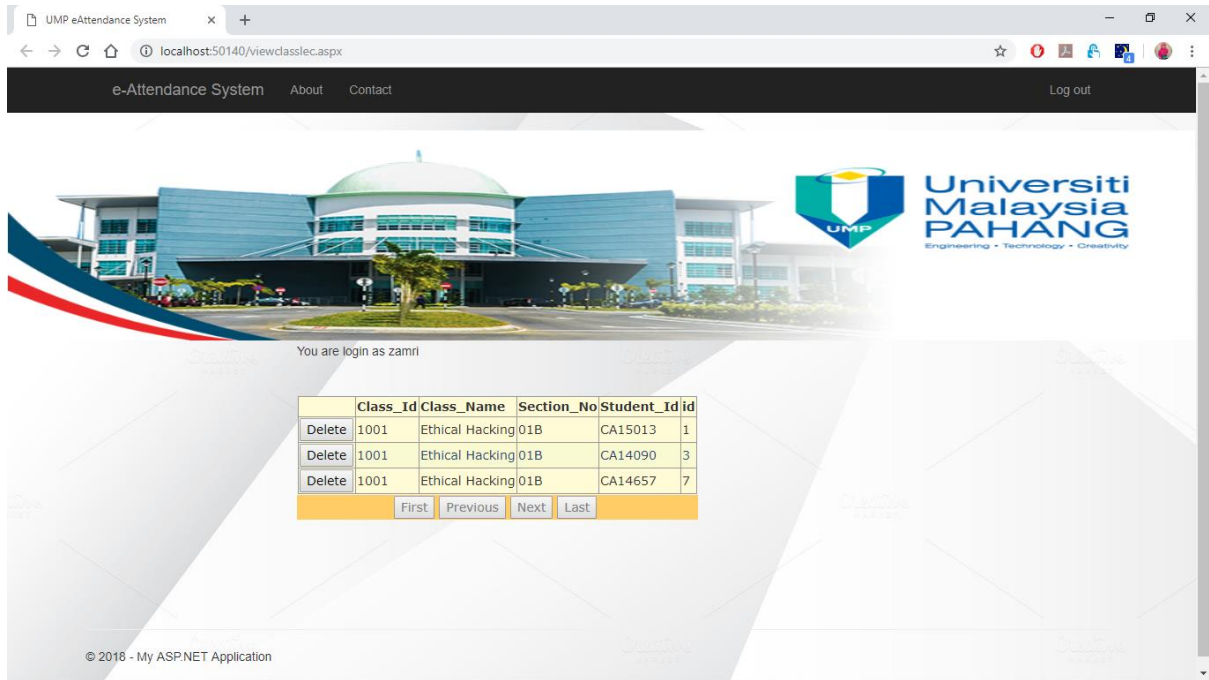


Figure 2.5 : Interface of View Class of the lecturer view

Figure 2.5 above shows the page when the lecturers choose to view class list from the homepage. This page will display all class details that registered by that lecturer

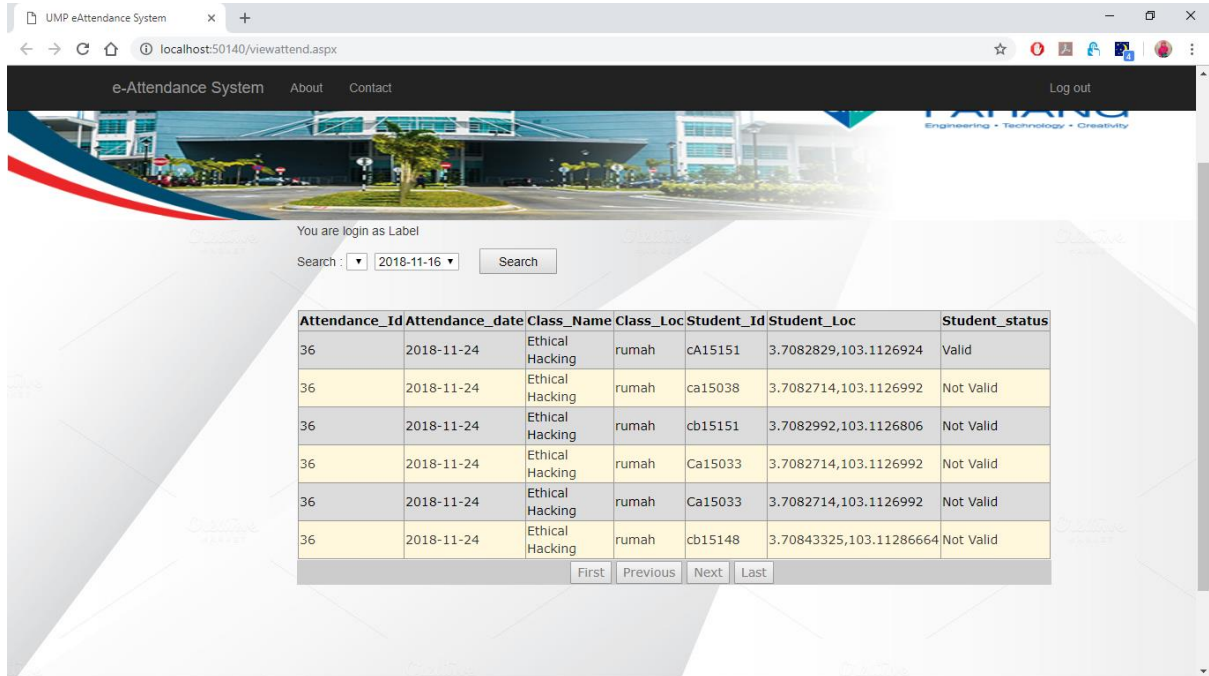


Figure 2.6 : Interface of View Attendance

Figure 2.6 above is the last interface of this system in lecturer view, lecturer can view attendance list of the attendance that has been created. They need to select the class name, section and date of the attendance.

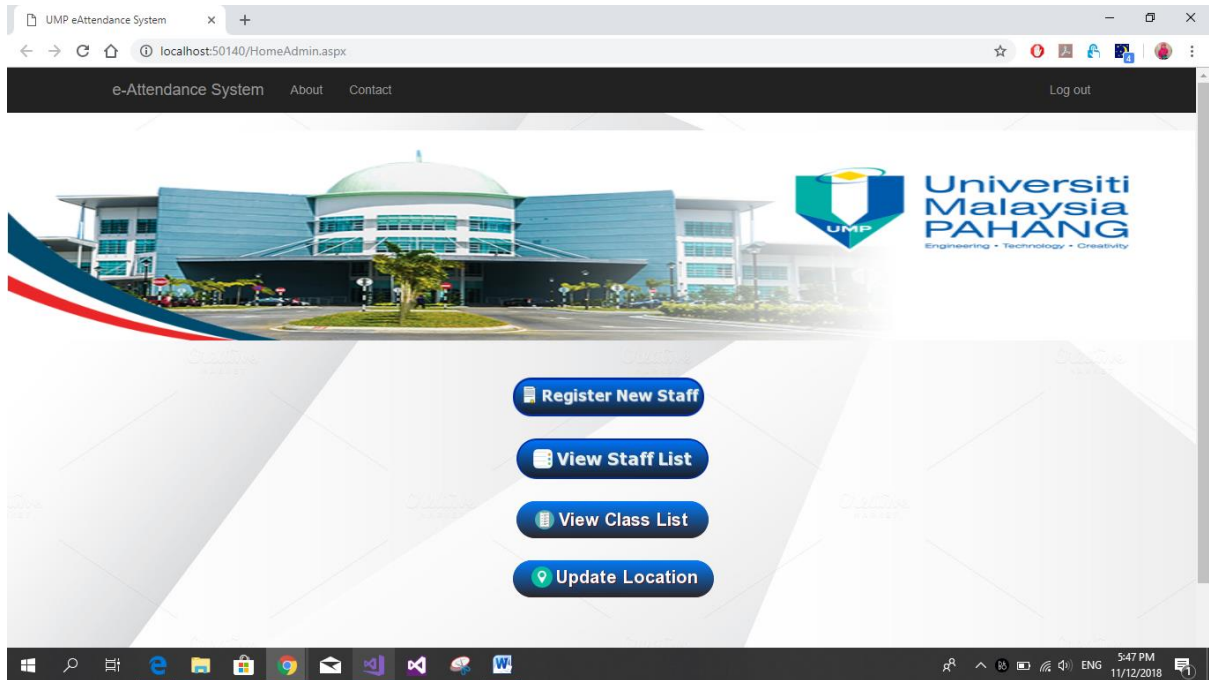


Figure 2.7 : Interface of Home Page of the Admin view

Figure 2.7 show the homepage of Admin view. Admin can choose either to register new staff, view staff list, view class list or update location into the system.

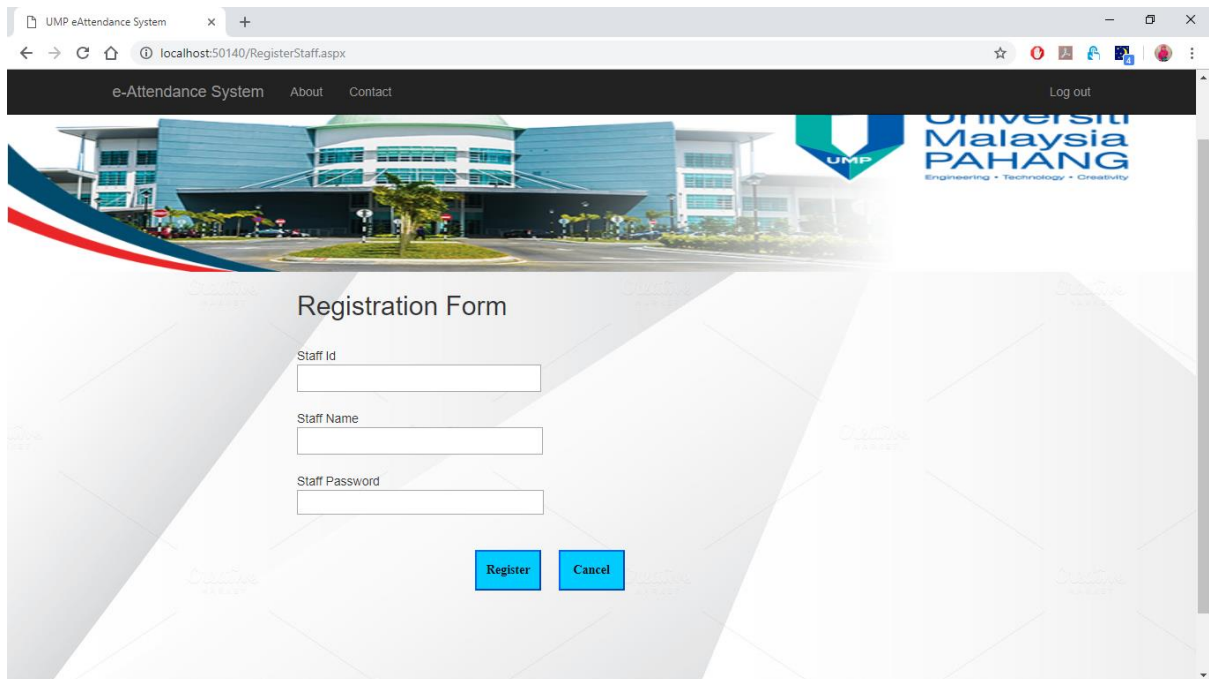


Figure 2.8 : Interface of Register New Staff of the Admin view.

In register new staff interface as shown in Figure 2.8 above, admin need to insert staff Id, staff name and staff password to register new staff into this system. Next, when admin hit “Update Location” button, they will redirect into Location directory page. Admin can view all the location registered and add new location. They also can edit and delete the registered location as shown in Figure 2.9

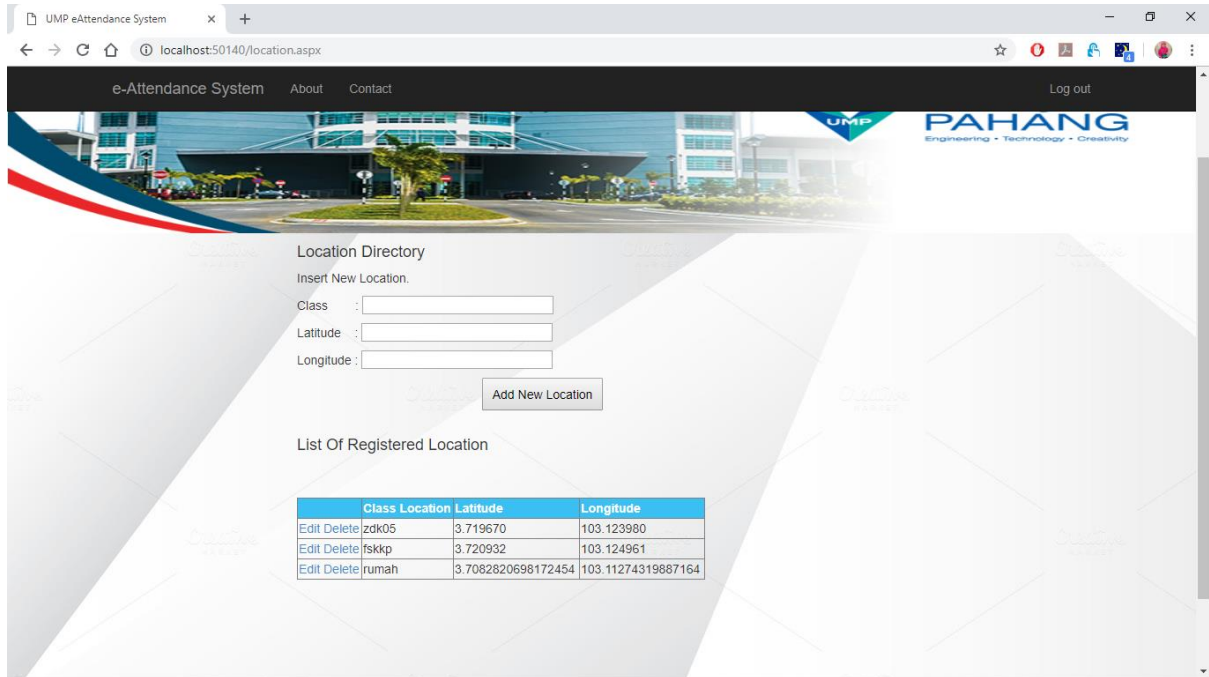


Figure 2.9 : Interface of Update Location of the Admin view.

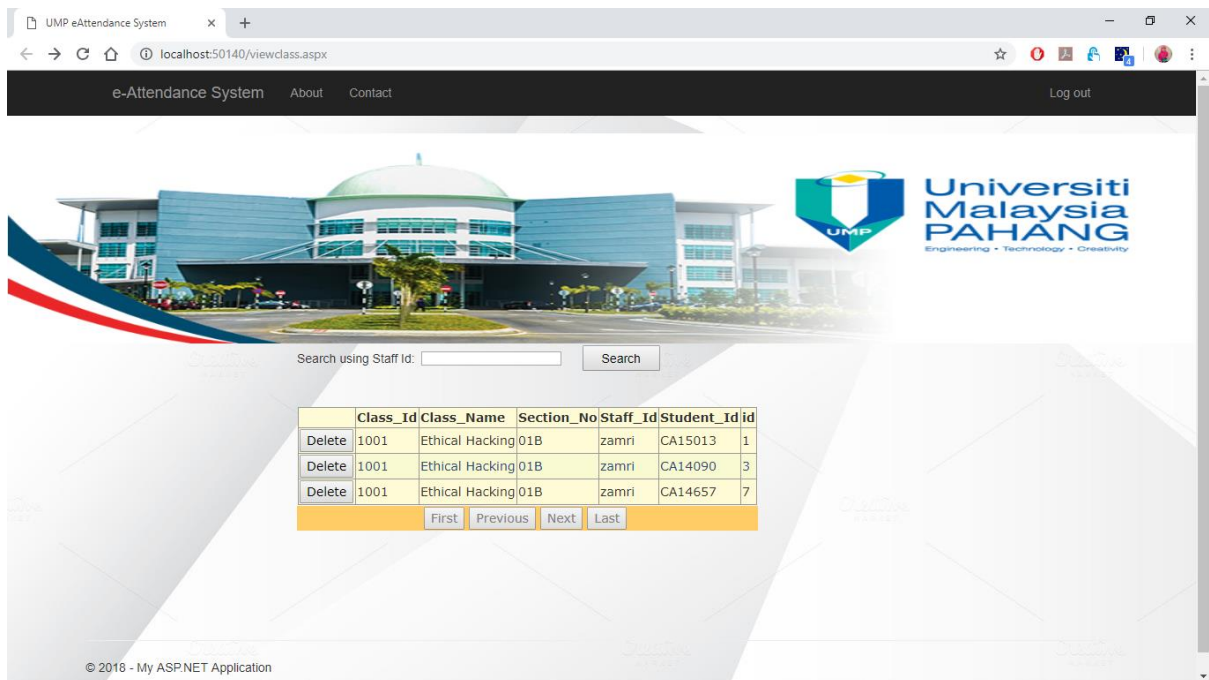


Figure 2.10 : Interface of View Class of the Admin view.

Other than that, as shown in Figure 2.10, admin also can view all class registered by lecturer and can search classes using staff id. Lastly, admin also can view all registered staff information as shown in Figure 2.11.

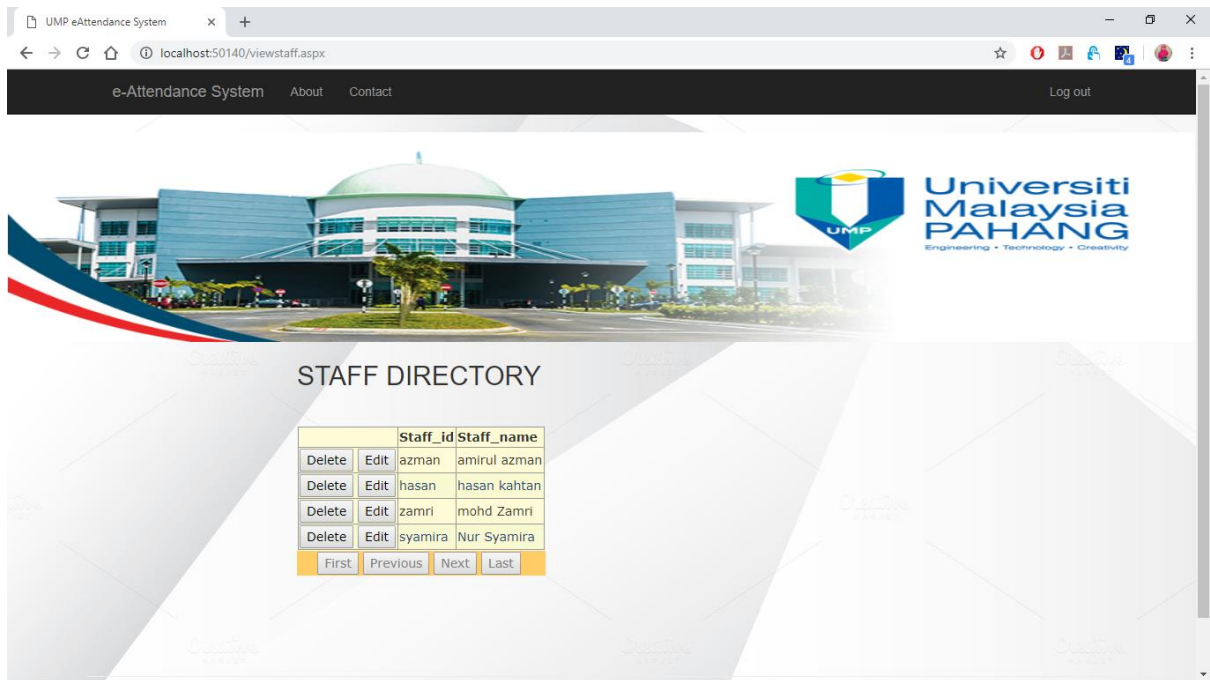


Figure 2.11 : Interface of View Staff List of the Admin view.

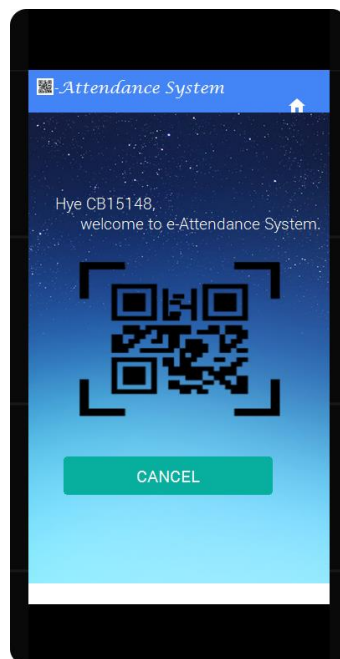


Figure 2.12 : Interface of Scan Attendance

Figure 2.12 above shows the interface of mobile application of this system. This mobile application will be use by student to check in the attendance. This interface is page where the application will scan the QR code that contains attendance Id. After that, user will be redirect to check in page as shown in Figure 2.13

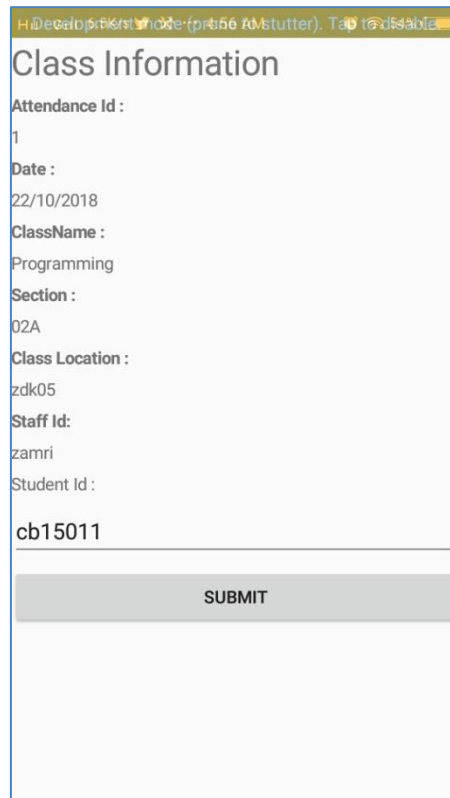


Figure 2.13 : Interface of Attendance Check In

3.0 SYSTEM DESIGN APPROVAL

	Name	Date
Verified by:	NOOR FATHIN SHAHIRAH BINTI AHMAT	1 st April 2018
<hr/> Developer		
Approved by:		1 st April 2018
<hr/> Client		

USER ACCEPTANCE TEST (UAT)

SECURE STUDENT ATTENDANCE SYSTEM BASED ON GEO-LOCATION AND QR CODE TECHNOLOGIES

**Faculty of Computer Systems & Software
Engineering (FSKKP)**

1.0 Testing Report

This section attached the User Acceptance Test (UAT) for Secure Student Attendance System Based on Geo-Location and QR Code Technologies. Functional testing applied for this testing process where it is used for testing in order to ensure that it conforms to all main functionality being specified within functional requirements.

As for user acceptance testing, main functions of this system are being tested by all type of users according to the test cases designed. The test cases designed based on the system test process where all main component and function of this system are included. Any errors or problems occur during testing are noted in the test cases for system correction. The test cases of this system are as followed.

1.1 Test Cases

Table 1 : Test Cases of Secure Student Attendance System Based on Geo-Location and QR Code Technologies

Event	Test Data	Expected Result	Actual Result	Pass/Fail	Comment
Login with correct username and password	Lecturer insert correct username and password	Successfully login	Able to login	Pass	-
Wrong username and password	Insert invalid username and password	Display error message	Display error message	Pass	-
Login with correct Admin username and password	Admin insert correct username and password	Successfully login	Able to login	Pass	-
Admin login with wrong username and password	Admin insert invalid username and password	Display error message	Display error message	Pass	-

Table 2 : Test Cases of Secure Student Attendance System Based on Geo-Location and QR Code Technologies (Cont.)

Event	Test Data	Expected Result	Actual Result	Pass/Fail	Comment
Scan QR code	Student scan QR that contain attendance Id	Display attendance Id in attendance label	Attendance Id displayed in attendance label after student scan the QR code	Pass	-
Student Check in the class	Student check in the attendance after insert student id	Display message box	Display message box "Attendance Success"	Pass	-
Student check in outside class area	Student check in the attendance outside class area	Attendance status is not valid	Attendance status is not valid	Pass	-
Student check in inside class	Student check in the attendance inside class area	Attendance status is valid	Attendance status is valid	Pass	-
Create new attendance	Insert attendance details	QR code is generated	QR code with attendance id is generated	Pass	-
Display attendance list	Insert attendance date, class name and section no	Display list of the student attendance	Display list of the student attendance with student attendance status	Pass	-
Delete attendance	Click delete button at action needed at View Attendance page to delete the student attendance	System will direct user to delete location information	Can delete attendance in View Attendance page	Pass	-

Table 3 : Test Cases of Secure Student Attendance System Based on Geo-Location and QR Code Technologies (Cont.)

Event	Test Data	Expected Result	Actual Result	Pass/Fail	Comment
Register new staff	Insert staff information and click button "Register" button	Display "registration success"	Display "registration success"	Pass	-
Edit location	Click edit button at action needed at Location Directory page to edit location information	System will direct user to edit location information	Can edit location information	Pass	-

2.0 System Testing Approval

	Name	Date
Verified by: <hr/> Developer		
Approved by: <hr/> Client (Lecturer/Admin)		
Approved by: <hr/> Client(Student)		