# HOSPITAL SMART VISITOR SYSTEM USING QR CODE TECHNOLOGY

**MUHAMAD FIRDAUS BIN ABDULLAH**



**Universiti Teknikal Malaysia Melaka (UTeM)**

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This report is submitted in partial fulfilment of the requirement for the award of Bachelor of Computer Science (Software Development)

**FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY**

**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**2016**

**DECLARATION**

I hereby declare that this project report entitled

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is written by me and is my own effort and that no part has been plagiarized without citations.

STUDENT: MUHAMAD FIRDAUS BIN ABDULLAH Date: 25/08/2016

SUPERVISOR: NURIDAWATI BINTI MUSTAFA Date: 26/8/2016

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JUDUL: **HOSPITAL SMART VISITOR SYSTEM USING QR CODE TECHNOLOGY**

SESI PENGAJIAN: 2015/2016

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**STUDENT : _____ Date: _____**

**(MUHAMAD FIRDAUS BIN ABDULLAH)**

**SUPERVISOR : _____ Date: _____**

**(CIK NURIDAWATI BINTI MUSTAFA)**

# DEDICATION

To my beloved parents and siblings

Thank you

For their endless supports and care for me

To my supervisor

Thank you

For her endless guidance, teaching and advice

To my classmates and friends

Thank you

For their effort helping and assisting me in completing the project.

# ACKNOWLEDGEMENT

Alhamdulilah, praise to Allah S.W.T for helping me to complete this “Projek Sarjana Muda (PSM)” successfully.

To the dean of Information Technology and Communication Faculty Prof. Dr. Burairah bin Hussin, for giving me chance to complete my bachelor programme and also helping me throughout this programme.

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To my beloved parents who always support and never tired of convincing me to achieve my determination and finishing my study without any delay. Last but not least, I would like to say thank you to all my friends who helped me to solve problem during the development of this project.

# ABSTRACT

The hospital smart visitor system register visitor of a hospital using the information inside Malaysian Identification Card. The current system use log book system which uses paper and laminated visitor pass. The visitor has to fill in forms to register as visitor and be given a visitor pass as authentication of registration. The existing visitor system used in most hospital nowadays faced many problems such as the paper log book system takes too much space and the possibilities of data loss is high, the limit number of visitor per ward cannot be achieved and handled by security personnel and the visitor pass often being passed to other family members to use at the security gate. The person registered as visitor will be given a receipt of printed QR code containing all the information of the visitation. This system wants to reduce the use of paper which is the log book and visitor pass system. The system verify visitor as family member of patient or not. This is the responsible of an admin to enter the information of the patient's heir into the system. The system also verifies the visitor through the QR code to ensure no violation of the use of QR code from other personnel other than the registered visitor only. The system also can limit the number of visitor in a critical type wards. Hospital Smart Visitor System uses Rapid Application Development methodology. This methodology is popular approach for small business project because the model and function can be developed in parallel. The methodology also allow a system develop in a short time and uses iteration process to make the system work better

# ABSTRAK

Hospital Smart Visitor System mendaftar pelawat menggunakan maklumat yang terkandung di dalam kad pengenalan Malaysia iaitu MyKad. System yang sekarang menggunakan buku log iaitu penggunaan kertas atau buku dan pas kertas keras. Pelawat harus mengisikan borang sebagai pelawat dan menerima pas pelawat sebagai bukti pendaftaran. System yang digunakan sekarang mengalami pelbagai masalah seperti penggunaan kertas yang mengambil terlalu banyak ruang dan kemungkinan untuk kehilangan semua maklumat itu adalah besar, menerhadkan bilangan pelawat di dalam satu wad pada suatu ketika adalah mustahil bagi system itu untuk capai dan susah diatur oleh pegawai keselamatan. Sistem yang baharu ini mahu mengurangkan penggunaan kertas. System ini juga mengesahkan pelawat sebagai ahli keluarga pesakit atau tidak. Tanggugjawab ini adalah tugas admin untuk memasukkan maklumat waris pesakit ke dalam system. System ini jugak mengesahkan pelawat melalui kod QR untuk memastikan tiada penyalahgunaan pas pelawat oleh individu yang tidak bertanggungjawab. System ini juga dapat mengehadkan jumlah pelawat bagi setiap wad kritikal.Hospital Smart Visitor System menggunakan metodologi Rapid Application Development. Metodologi ini popular untuk membangunkan system kecil. Metodologi ini juga membenarkan satu system dibina dalam masa yang pendek dan menggunakan lelaran untuk memastikan system dapat dibangunkan dengan sempurna.

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## List Of Abbreviation

| | |
|---|---|
| RAD | Rapid Application Development |
| ERD | Entity relationship diagram |
| RAM | Random access memory |
| OS | Operating system |
| SDK | Software development kit |
| JDK | Java Development kit |
| QR code | Quick Response Code |
| DFD | Data Flow Diagram |

# CHAPTER I

## INTRODUCTION

In most Hospital in Malaysia, they are using paper based system in registering the visitor who want to visit patient in the hospital. They get a visitor pass after registering as a visitor. This Hospital QR code smart visitor system wants to reduce the use of paper and visitor pass system. The visitor will insert their Identification card which is MyCard to the card reader and automatically being registered as visitor and will be given a reciept of printed QR code for the visitor. The QR code will be scanned at the security personnel guarding the entrance to the patient ward. The system will verify the visitor and ensure that the scanned QR code cannot be used by other personnel other than the registered person only.

## 1.1 Problem Statement

1. Paper based system takes too much space and the possibilities of data loss are high.
2. Limit the number of visitor for each kind of ward cannot be achieved and handled by the security personnel.
3. The visitor pass often being passed to other personnel for example other family members to use the visitor pass.

## 1.2 Objective

1. To assist staff of the hospital to register and search visitor for security issues and assist security personnel to handle visitor.
2. To replace the paper based system and visitor pass to computerized based system.
3. To create a mobile friendly application.

## 1.3 Scope



The purpose of Hospital QR code Smart Visitor System is to build a system which eases the operation of the visitation of visitor to a hospital. The system generates QR code for user as visitor pass after the system get data from the identification card of the visitor. All data of visitor will be stored in a database. The scope of the system is divided into three which are:

1. Admin

   Add, update and search. The responsibilities for admin are register Visitors and generate QR code. Assist in searching visitor based on the time and day of visit

   .

2. Security personnel

Request the permission of QR code based on the registration. Security personnel can scanned the QR code given to the visitor to view the information of the visitor which is their name, gender and the ward that they wanted to visit.

3. Visitor

Visitor hands in their identification card to the receptionist which is the admin to obtain the QR code.

## 1.4 Project Significant

There are some benefits for users either for a visitor or admin when using this Hospital Smart QR Code Visitor System. The benefits of using this system is to help admin manages and simplifies a record, maintenance and accessed information for future references. Visitor also does not need to fill forms. Visitor only has to hand in their identification card to register into the system. The system also allows the security personnel to identify the registration of the QR code owner. This will ensure that the QR code is not being violated by other visitor. Furthermore, this system has a friendly interface so it can be use easily.



## 1.5 Expected Output

The expected output of this system is to allow the users which are the admin and visitor to register into the system much efficient and user friendly. Admin can simplify a record, maintenance and accessed information of the visitor. Furthermore, the system also ensure the QR code generated based on the registration is not violated by any other user.

## 1.6 Conclusion

As conclusion, this project can help visitor to register faster and easier. Besides, the system also gives the benefits for admin to simplify a record, maintenance and accessed information for future references. All objectives have been stated. Therefore, there are a few step need to be taken to achieve those objectives.

# CHAPTER II

# LITERATURE REVIEW AND PROJECT METHODOLOGY

## 2.1 Introduction

Hospital Smart QR code Visitor System is a system that provides more efficient way of registering visitor quickly and more secure way than existing system used in most hospital nowadays. The registration of visitor by their MyKad is easier than the visitor has to fill up forms to obtain a visitor pass. The burden of the security personnel work in handling the number of visitor in each room also been reduced as the system can verify the number of QR code generated is based on the number of limit visitation of each room per day. In this chapter, the finding is based on the comparison of existing system, advantages and disadvantages of the system, the suitable methodology used, project requirements and project schedule and milestone.



## 2.2 Facts and Findings

### 2.2.1 Domain

Following are the list of type of users:

- Admin/Staff
- Security personnel
- Visitor

Admin or staffs uses the system for the purpose of:

1. Add, update and register visitor – admin has the right to ask for visitor MyKad for registering purpose.
2. Generate QR code – admin can request a QR code after the registration is verified.

Security personnel

1. Scan QR code using a smart phone – The security personnel job is to scan the QR code given by the visitor to valid the visitor and the registration.
2. Visitor
3. Hand over their MyKad for registration.

### 2.2.2 Existing System

There are several visitor management systems that have been used for comparison with Hospital Smart QR code Visitor System which is Lobby Track Visitor Management and VisitLog. Each of them has different purposes but they are designed and develop to manage the visitation of an organisation. The comparison is based on the functionality and the advantages and disadvantages of the system.

Table 2.1: The Comparison between Advantages and disadvantages of visitor management system

| Visitor management system | Advantages | Disadvantages |
|---|---|---|
| Lobby Track Visitor Management | Self-register and check in / out at unattended kiosks.<br>Preform automatic immediate background checks for enhanced security. | Cannot limit the number of visitor in a session. |
| VisitLog | List all the visitor at current time and display the reason of visit. | Cannot limit the number of visitor in a session.<br>Visitor has to wear a badge that valid they are registered visitor. |
| Log Book | | User has to fill up their information, data might be loss, hard to keep track of visitor and cannot handle visitor number per ward. |

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Based on Table 1, there are comparison between the system on the advantages and disadvantages of the system which is the Lobby Track Visitor Management and VisitLog. As we can see, both of the system is well developed but the systems are costly and burdensome for an organisation to implement on their company. Furthermore, it is only suitable for organisation that has no limit on the number of visitor in a session. Both of the system is not suitable for a hospital to implement as the number of visitor is limit based on the type of room or ward that they wanted to visit. Therefore, the Hospital Smart QR code Visitor System is designed to make the visitor management system suitable for the functionality of a hospital organisation.

Proposed application features:

1. Limit the number of visitor in each type of ward or room.
2. Implementation of QR code as visitor passes which can be obtained through the receptionist or be taken picture by the visitor itself.
3. Add, update and delete patient's heir so that no unauthorized visitor can visit any patient.

### 2.2.3 System Development Technique

Technique used in development of the system is Structured Programming. Structured programming is a subset of procedural programming that enforces a logical structure on the program being written to make it more efficient and easier to understand and modify.

Structured programming uses top-down design model, which developers map out overall program structure into different subsection. A defined function or a set of function is coded in separate module or submodule, which mean that the code can be loaded into memory more efficiently and that module can be reused in other programs.

## 2.3 Project Methodology

The Smart QR Code Visitor System uses Rapid Application Development methodology. This methodology is popular approach for small business project. The model and function can be developed in parallel. The methodology allow a system develop in a short time and uses iteration process to make the system work better.

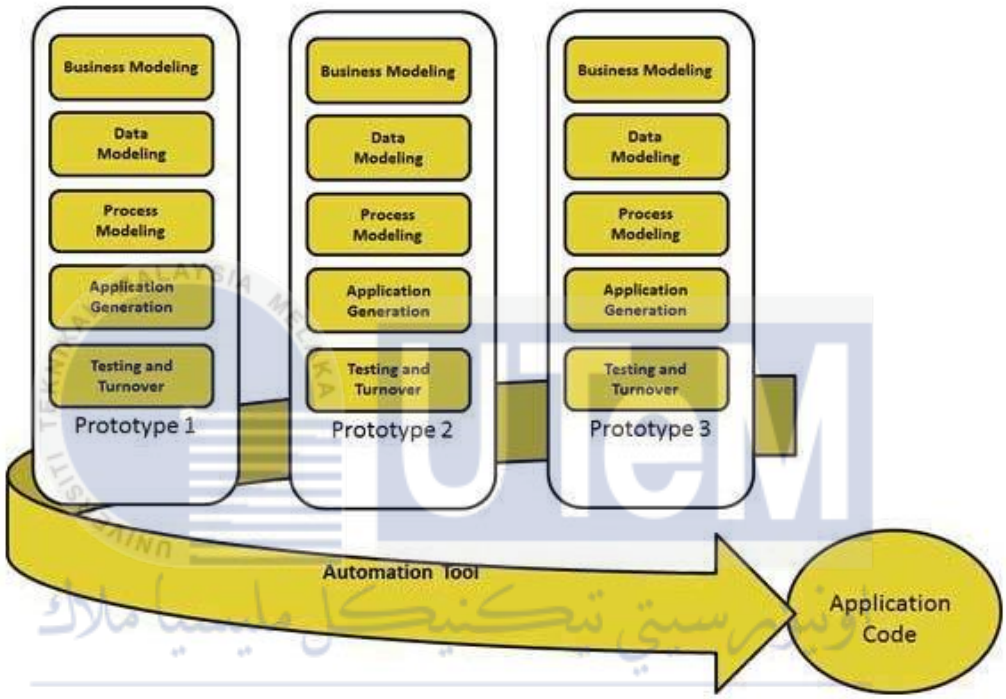





Figure 2.1 Rapid Application Development Model

RAD model distributes the analysis, design, build, and test phases into a series of short, iterative development cycles. Following are the phases of RAD Model:

In the Business modelling, the business model for the product under development is designed in terms of flow of information and the distribution of information between various business channels. A complete business analysis is performed to find the vital information for business, how it can be obtained, how and when is the information processed and what are the factors driving successful flow of information.

In the Data Modelling phase, the information gathered in the Business modelling phase is reviewed and analysed to form sets of data objects vital for the business. The attributes of all data sets is identified and defined. The relation between these data objects are established and defined in detail in relevance to the business model.

In Process modelling phase, the data object sets defined in the Data modelling phase are converted to establish the business information flow needed to achieve specific business objectives as per the business model. The process model for any changes or enhancements to the data object sets is defined in this phase. Process descriptions for adding, deleting, retrieving or modifying a data object are given.

In Application Generation phase, the actual system is built and coding is done by using automation tools to convert process and data models into actual prototypes.

Lastly in Testing and Turnover, the overall testing time is reduced in RAD model as the prototypes are independently tested during every iteration. However the data flow and the interfaces between all the components need to be thoroughly tested with complete test coverage. Since most of the programming components have already been tested, it reduces the risk of any major issues.

## 2.4 Project Requirement

### 2.4.1 Software Requirement

Collection of software that being used during the development stages of the system as follows:

Table 2.2: Collection of software used

| No. | Software | Descriptions |
|---|---|---|
| 1 | StarUML (Version 5.02.1570) | StarUML is an open source software modelling tool that supports unified modelling language (UML). |
| 2 | Microsoft Office 2010 | To produce documentation during the development. |
| 3 | Microsoft Visio 2007 | Create professional diagrams to simplify complex information with updated shapes, collaboration tools, and data-linked diagrams. |
| 4 | Delphi 7 | The application's source codes were written in. |
| 5 | Xampp | XAMPP is a product for database. |
| 6 | Android Studio | A platform for Android application development and the application's source codes were written in. |

### 2.4.2 Hardware Requirement

Collection of hardware that is being used during the development stages of the system:

Table 2.3: Collection of Hardware used

| No. | Hardware | Description |
|---|---|---|
| 1 | Laptop | The main unit during the development stages. |
| 2 | Printer | To print the documentation. |
| 3 | Smart Phone | For mobile apps. |
| 4 | MyKad Reader | Hardware to read MyKad |



### 2.5 Project Schedule and Milestones

### 2.5 Project Schedule and Milestone

Table 2.4: Project Schedule

| Task Name | W1 | W2 | W3 | W4 | W5 | W6 | W7 | W8 | W9 | W10 | W11 | W12 | W13 | W14 | W15 | W16 | Product |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Proposal | ■ | ■ | ■ | | | | | | | | | | | | | | Project Proposal |
| Analysis & Methodology | | | | ■ | ■ | | | | | | | | | | | | Chapter 2 & 3 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Design & Implementation | | | | | | | | | | | | | | | | Chapter 4 & 5 |
| Demo & Testing | | | | | | | | | | | | | | | | Chapter 6 |
| Actual Presentation | | | | | | | | | | | | | | | | Completed System |

Table 2.5: Milestones

| **Week** | **Activity** |
|---|---|
| 1<br>22 - 26 February | Proposal PSM : Submission & Presentation |
| | Proposal assessment and verification |
| 2<br>29 - 4 March | Proposal Correction/Improvement<br>Chapter 1 |
| 3<br>7 - 11 March | Chapter 1 |
| 4<br>14 - 18 March | Chapter 1 & Chapter 2 |
| | Chapter 2 |

| | |
|---|---|
| 5<br>21 - 25 March | |
| 6<br>28 Mar - 1 April | Chapter 2<br>Progress Presentation 1 |
| 7<br>4-8 April | Project Demo & Chapter 3<br>Chapter 4 |
| 9<br>18-22 April | Project Demo & Chapter 4 |
| 10<br>25 - 29 April | Progress Presentation 2 |
| 11<br>2 - 6 May | Project Demo |
| 12<br>9 – 13 May | Project Demo & PSM Report |
| 13<br>16 - 1 June | Project Demo & PSM Report |

## 2.6 Conclusion

This chapter covered the domain and technology studies and comparison of existing system. The development technique and methodology of the system is also defined and it is suitable for the technique and methodology to be implemented into the system.

# CHAPTER III

# ANALYSIS

## 3.1 Introduction

In this chapter, the proposed application will be studied more specific to know clearly about the basic requirement of the system. This application should satisfy the application requirement during testing phase. Requirement of the application is collected based on previous chapter. This chapter also discussed about the requirement analysis, type of data in this application which will be illustrated using data model and the application's functional and non-functional requirement also will be specified. This chapter also will cover the project goals and the purpose so that it will be related to the objective of this project.

## 3.2 Problem Analysis

In the existing visitor management system used in most hospital, there are some problem arise. The number of visitor in each room or ward cannot be monitored by the security personnel as the visitor pass is often being passed on other visitor that not registered yet. Some of the registration also contains false information of the visitor, and this troublesome for the receptionist to track the visitor if emergency happened.

As we know, all Malaysian citizens have MyKad which is brought along almost every time they leave their house. The system takes advantage of this by accessing accurate information of the visitor for the registration. To limit the number of visitor in each room or ward in a session, the system itself will validate whether the registration of the visitation based on the total number of registration in the current session. Any other registration after the limit of visitor has reach, the system will deny the registration.

## 3.3 Requirement Analysis

### 3.3.1 Data Dictionary



Table 3.1: Data dictionary for login database

| Field name | Data type | Field size | Description |
|---|---|---|---|
| user_id | Integer | 5 | Auto generate identification that will be unique to all user |
| user_username | String | 10 | Store the username of the user |
| user_password | String | 10 | Store the password of the user |
| user_type | integer | 1 | Determine which user is logged in. |

Table 3.2: Data dictionary for registration database

| Field name | Data type | Field size | Description |
|---|---|---|---|
| r_identification | String | 50 | Store the Ic no of the visitor |
| r_name | String | 50 | Store the name of the visitor |
| r_gender | String | 10 | Store the gender of the visitor |
| r_address | String | 50 | Store the address of the visitor. |
| r_religion | String | 20 | Store the religion of the visitor |
| r_race | String | 20 | Store the race of the visitor. |

Table 3.3: Data dictionary for ward database

| Field name | Data type | Field size | Description |
|---|---|---|---|
| ward_id | String | 10 | Auto generated id that identify each ward |
| ward_type | String | 10 | Store the type of the ward |
| ward_cap | String | 10 | Store the capacity of each ward. |

Table 3.4: Data dictionary for patient database

| Field name | Data type | Field size | Description |
|---|---|---|---|
| patient_id | Int | 10 | Auto generated id that identify each patient |
| patient_name | String | 50 | Store the name of the patient |
| patient_ic | Integer | 20 | Store the ic number of the patient |
| ward_id | Integer | 10 | Foreign key from the table ward |

Table 3.5: Data dictionary for visit database

| Field name | Data type | Field size | Description |
|---|---|---|---|
| V_id | Integer | 10 | Auto generated id that identify each visitation |
| R_identification | String | 20 | Foreign key from the table registration |
| Ward_id | integer | 10 | Foreign key from the table ward |
| V_date | String | 20 | Store the date of the visitation |
| V_time | String | 20 | Store the time of the visitation |
| Qr_codeId | String | 20 | Store the QR code information of the visitation |

Table 3.6: Data dictionary for heir database

| Field name | Data type | Field size | Description |
|---|---|---|---|
| Heir_name | String | 50 | Store the name of heir of patient |
| Heir_ic | String | 20 | Store the ic number of heir |
| Patient_name | String | 50 | Foreign key from table patient |



### 3.3.2 Functional Requirement

The Smart QR Code Visitor System consists of 8 modules. The system consists of 2 platforms which is the desktop application and mobile application. The desktop application developed mainly for admin use while the mobile application is for security personnel. The desktop application consists of 5 modules which are Login, Read MyKad, Register Visitor, Validate and Register Visit, and Generate QR Code. The mobile application consists of 3 modules which are Login, Scan QR Code and Display Registration.

Desktop Application:

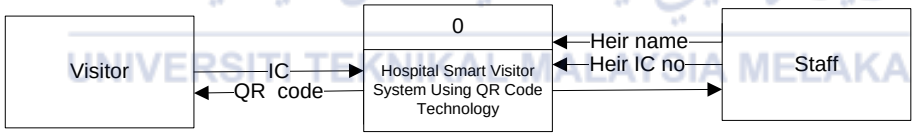
- Login – authenticate user.
- Read MyKad – read the information of the MyKad for register purpose.
- Register Visitor – register the MyKad as visitor.
- Validate and Register Visit – Validate the registration of visit of a room or ward and registering the visit.
- Generate QR Code – generate QR code based on the valid registration.

Mobile Application:

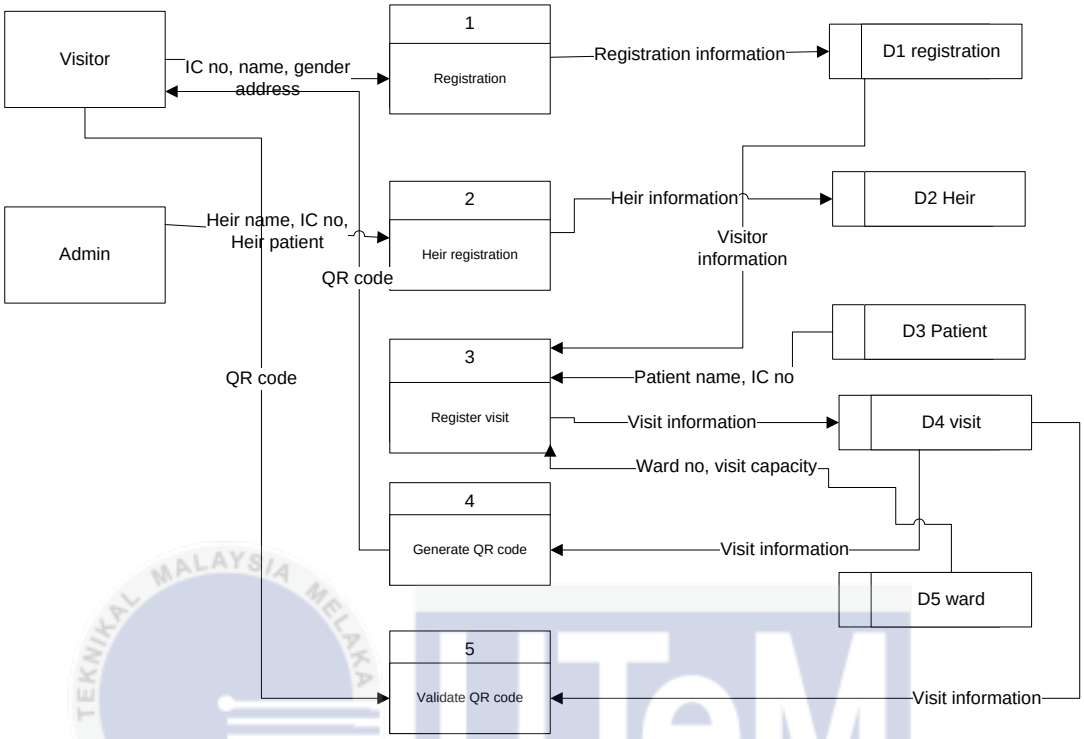
- Login – authenticate user
- Scan QR Code – scan the QR code of the visitor
- Display Registration – display the information of the registration of the visitor.

### 3.3.2.1 Data Flow Diagram

#### 3.3.2.1.1 DFD Level 0



### 3.3.2.1.1 DFD Level 1




### 3.3.3 Non-Functional Requirement

The Smart QR Code Visitor System, there will be 2 non-functional requirement that is security and usability.

Data integrity:

- The data of the system is the same whenever the data is accessed.

Usability:

- The used of the system is simple by only the use of mouse.
- Ensure the registration is correct and accurate.

## 3.4 Conclusion

As of this chapter, the details of the proposed system is discussed and specified. The detail discussed in this chapter includes data requirement, functional requirement and non-functional requirement.

# CHAPTER IV

# DESIGN

## 4.1 Introduction

This chapter discussed about the design of the application with more details. The modules or design specification of all functions also will be discussed in details throughout this chapter. Interface of the design inputs, design output and design of the database for this project also will be explained in detail.

The high-level design explains the architecture that would be used for developing the application. The architecture provides an overview of the system, identifying the main components of the application which is system architecture design, user interface design and database design. System architecture design will explain about the application architecture view presented in layer, framework, tier or patent. It also defines the interaction between database, hardware and software.

User interface design will explain about the interface of the application. Input design is a design that allow user to enter input data to a computer of mobile device. The reason of user interface design is to provide graphical and interactive interface for user.

Furthermore, database design also will be explained in this chapter. The details of the database and the usage in the application will be explained in detail through the chapter.

## 4.2 High-Level Design

### 4.2.1 System Architecture

System architecture is the conceptual model that defines structure, behaviour and views of the system. An architecture description is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behaviours of the system.

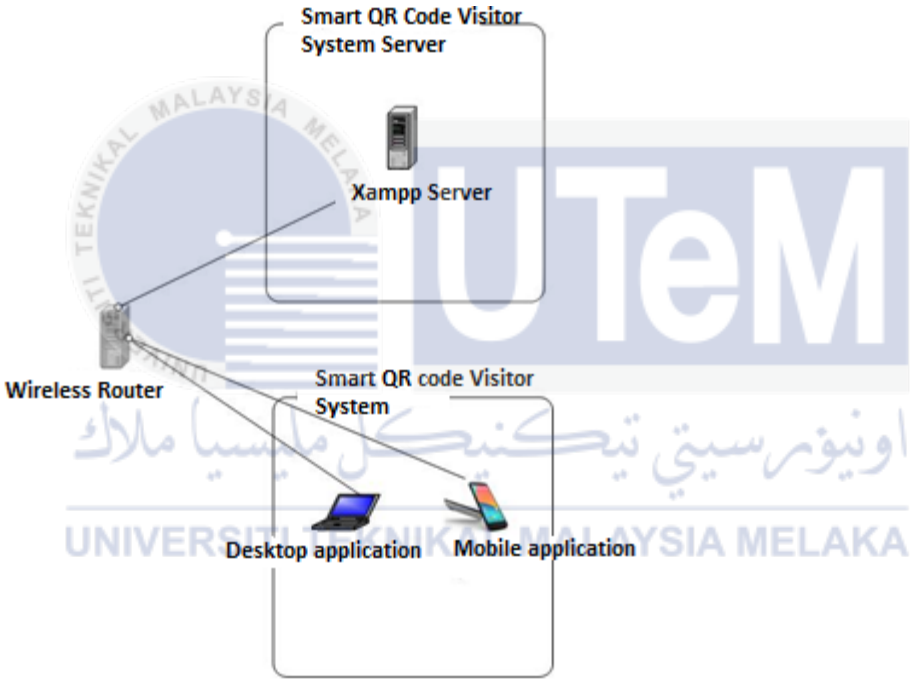



Figure 4.1 show the system architecture of Smart QR Code Visitor System

### 4.2.2 System Interface Design

Smart QR Code Visitor System has 2 platform of interface. The first platform is the desktop application and the second platform is the mobile application.

#### 4.2.2.1 Desktop Application

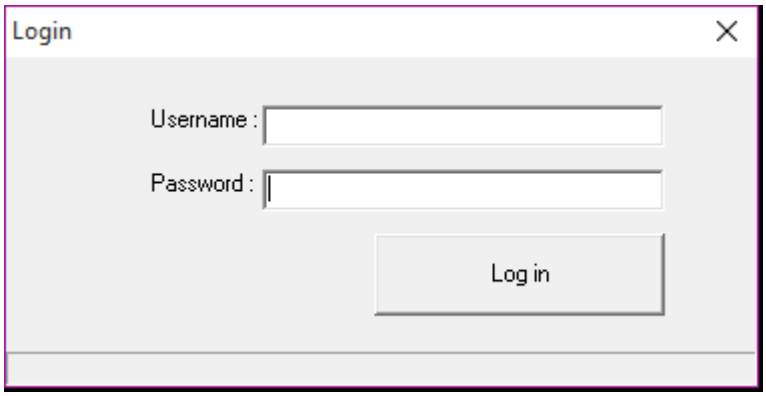



Figure 4.2 login form for admin or staffs.

This is the interface that is showing when the application is launched from the desktop application

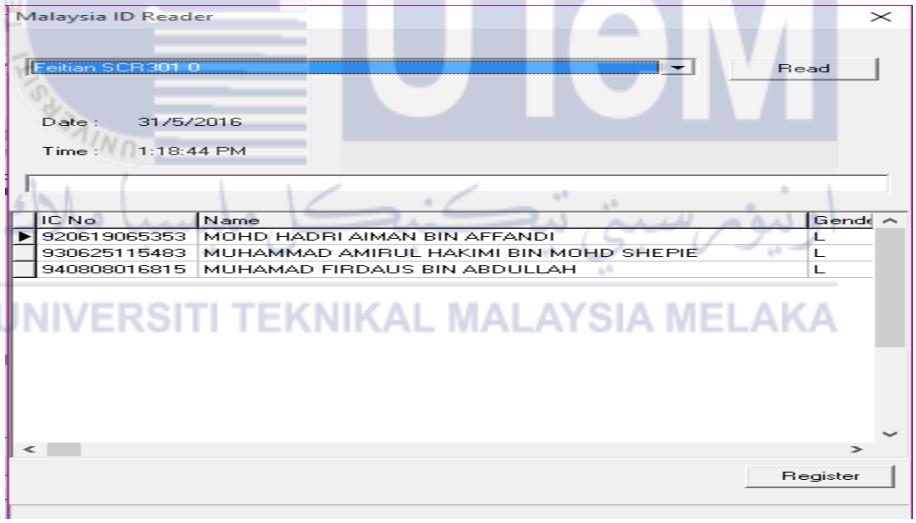





Figure 4.3 interface to read MyKad.

After the login of the user is successful, the user is allowed to read MyKad from here. If the user is already registered, the name information of the user will be available in the list as shown in the figure.

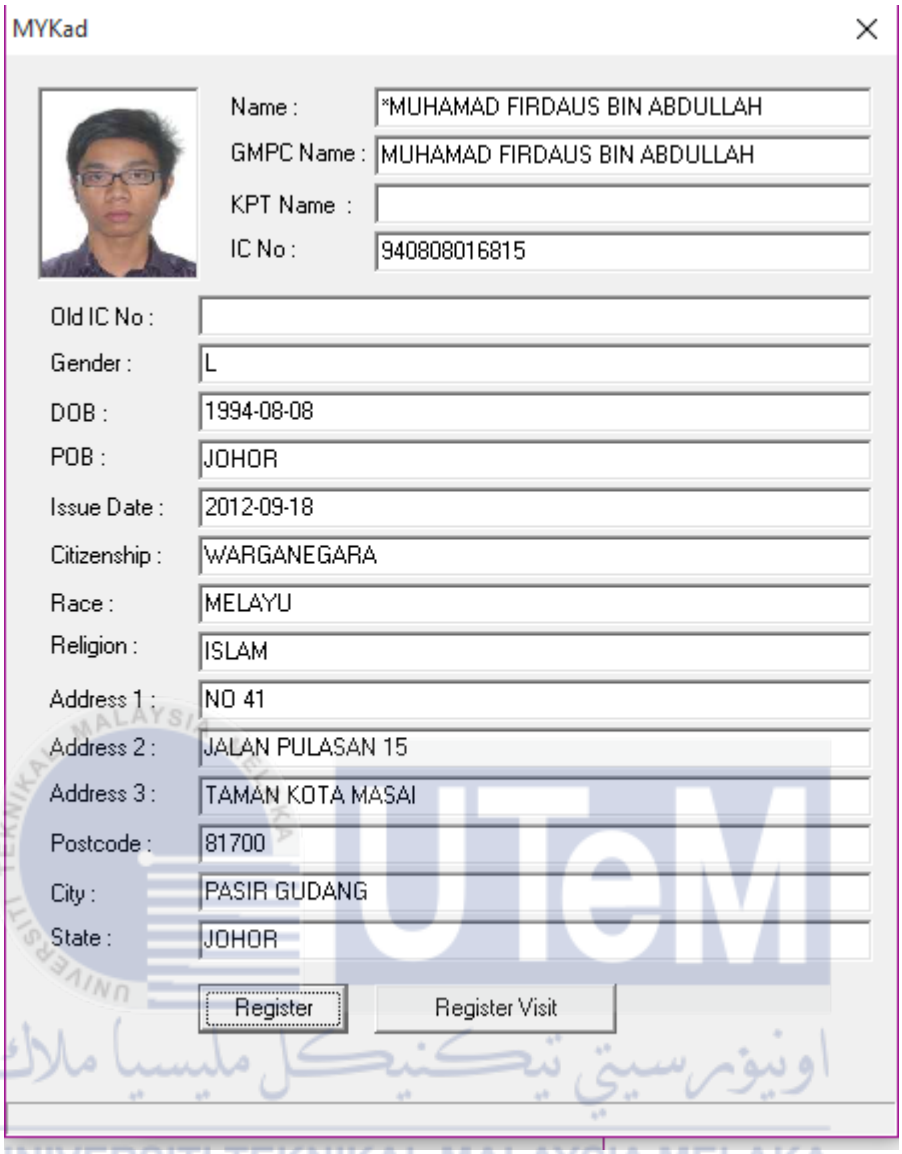





Figure 4.4 information of MyKad.

This is the result after the system read the MyKad. All the information is listed in the form. In this interface, the user which is the receptionist can either register the MyKad if the visitor is not registered yet or, register visit if the visitor has registered into the system.

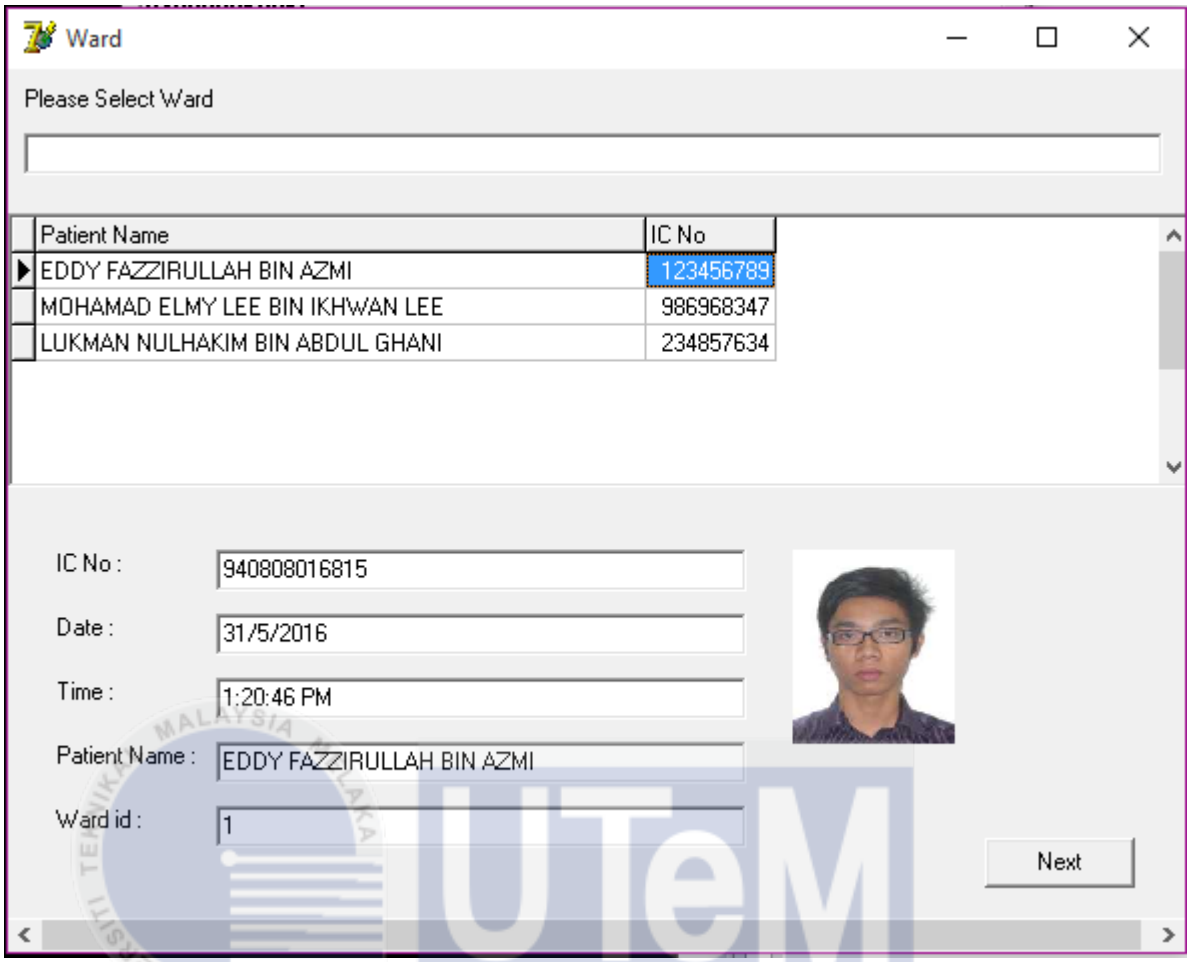



Figure 4.5 ward to visit.

This is the next interface that shows the patient of the hospital. The receptionist can search for the patient that the visitor wanted to visit.


Figure 4.6 QR code generated.

Figure 4.6 shows the QR code generated after a success visit registration. After conformation of the patient is done, this interface will showed up with the QR code of the registration of the visit. The visitor can either take a picture of the QR code or obtain a receipt of QR code printed on it to be presented to the security personnel guarding the door to the ward.

#### 4.2.2.2 Mobile Application

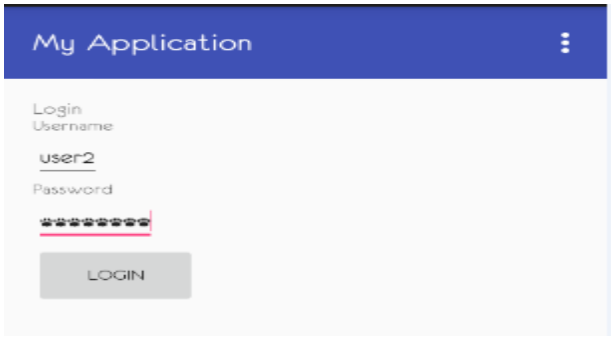



Figure 4.7 Login form of mobile application

Figure above shows the login form for security personnel. This interface showed up in the mobile application. The interface prompted the user to login into the system.

Figure 4.8 QR code scanner

Figure above shows the interface to read the QR code. The interface uses camera of the mobile phone to read the QR code given by the visitor.

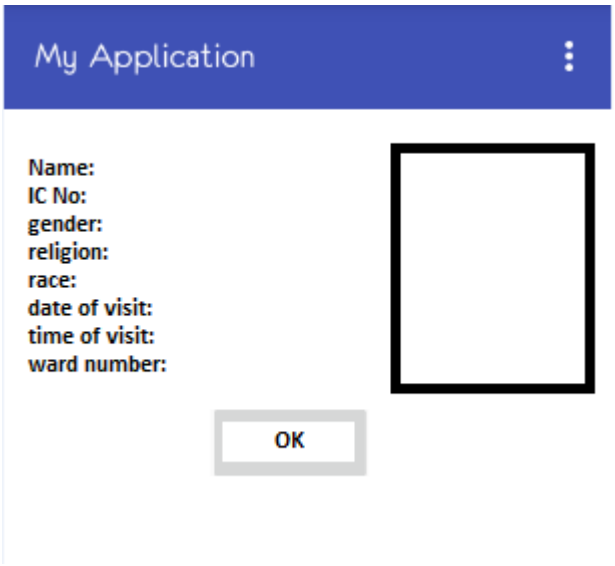



Figure 4.9 Result after complete scanning

Figure 4.9 shows the result of the scanned QR code. After the scanner read the QR code, interface will shows information of the visitor and the registration of the visitation.

### 4.2.3 Database Design

#### 4.2.3.1 Conceptual and Logical Database Design



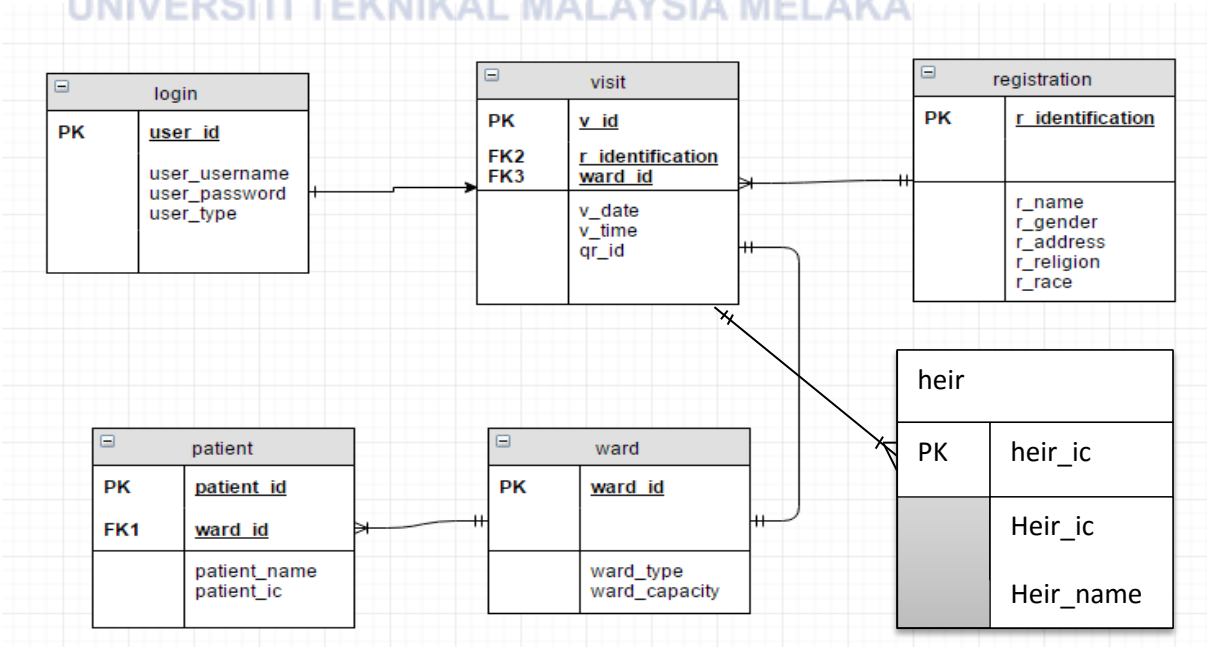


Figure 4.10 Entity Relationship Diagram of the database of the system

## 4.3 Software and physical database design

### 4.3.1 Software Design

Software design is the process of defining software method, functions, objects and the overall structure and interaction of code. Smart QR Code Visitor System is a multiplatform application. In the desktop application, the application is entirely developed using pascal programming language. In the android mobile application, java programming language is used to create the implementation method. For the interface method, this application uses xml language. For the database, xampp server is used which is an SQL database.

### 4.3.2 Physical database design

Process of producing a description of the implementation of the database on secondary storage; it describes the base relations, file organizations, and indexes used to achieve efficient access to the data, and any associated integrity constraints and security measures.

Table 4.1: Physical database design

| Table | Column | Data type |
|---|---|---|
| Login | user_id | Integer |
| | user_username | String |
| | user_password | String |
| | user_type | Integer |
| patient | patient_id | Integer |
| | patient_name | String |
| | patient_ic | Integer |
| Registration | r_identification | String |
| | r_name | String |
| | r_gender | String |
| | r_address | String |
| | r_religion | String |
| | r_race | String |
| Visit | v_id | Integer |
| | v_date | String |
| | v_time | String |
| | qr_codeId | String |
| Ward | ward_id | String |
| | ward_type | String |
| | ward_cap | String |
| Heir | heir_name | String |
| | heir_ic | String |
| | heir_patient | String |

## 4.4 Conclusion

This chapter discussed about the design of this application which includes high-level design and detailed design. For the high-level design it is divided into three categories which are system architecture, user interface design and database design. The next design discussed is software and physical database design. As the conclusion, this application is using java as the main language for development.

# CHAPTER V

# IMPLEMENTATION



## 5.1 Introduction

This chapter will discuss about the implementation of the system. System implementation is the process of defining how the system is build and ensuring that the system is operational. The main objective of preparing the application to meet the quality standard is to make sure the system is available to a set of users and positioning on-going support and maintenance for the application

Implementation phase is where technical IT carries out the execution of practice plan, method and design of this application. The execution includes installation, configuring, running, testing and making necessary changes of the application.

## 5.2 Software development and environment Setup

### 5.2.1 Delphi 7

Delphi 7 is a software development kit for desktop, mobile, web and console applications. Delphi's compilers use their own Object Pascal dialect of Pascal and generate native code for several platforms. Delphi was originally developed by Borland as a rapid application development tool for Windows.

### 5.2.2 Android Studio v1.3.2

Android Studio is an integrated development environment that specifically used to develop android application based on JetBrains, IntelliJ IDEA software. Android studio is a replacement for Eclipse Android Development Tools (ADT) as Google's primary IDE for native Android application development.

## 5.3 Software configuration management

Software configuration management shows the setup and configuration of software used in this project development.



### 5.3.1 Installation of Delphi 7

i. Download Delphi 7 software from the internet. The software can be found in www.learning-delphi.com
ii. Launch the application installer Delphi7en.exe.(Figure 5.1)

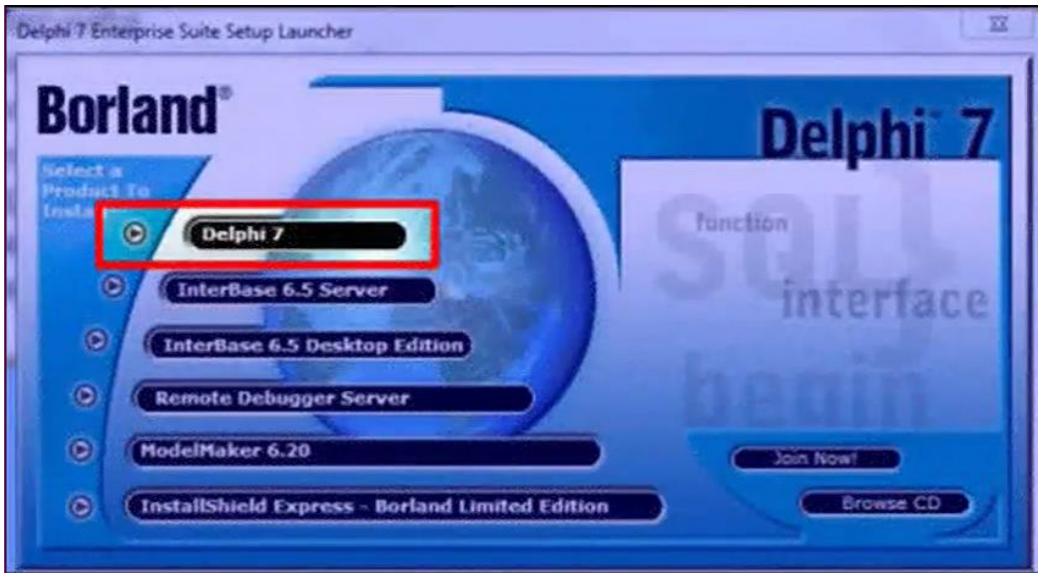



Figure 5.1 start-up of Delphi 7 installation setup

iii. Click on Delphi 7.

iv. Click Next to install Delphi 7.(Figure 5.2)

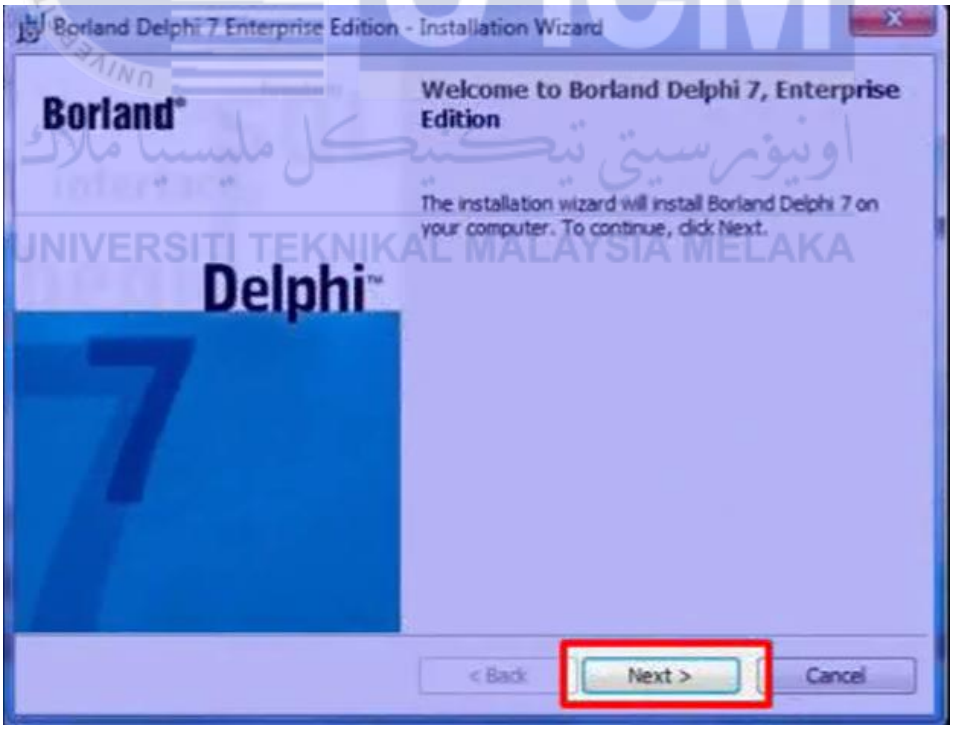



Figure 5.2 installation of Delphi 7

v. Click next and then tick on accept the agreement tick box.(Figure 5.3)

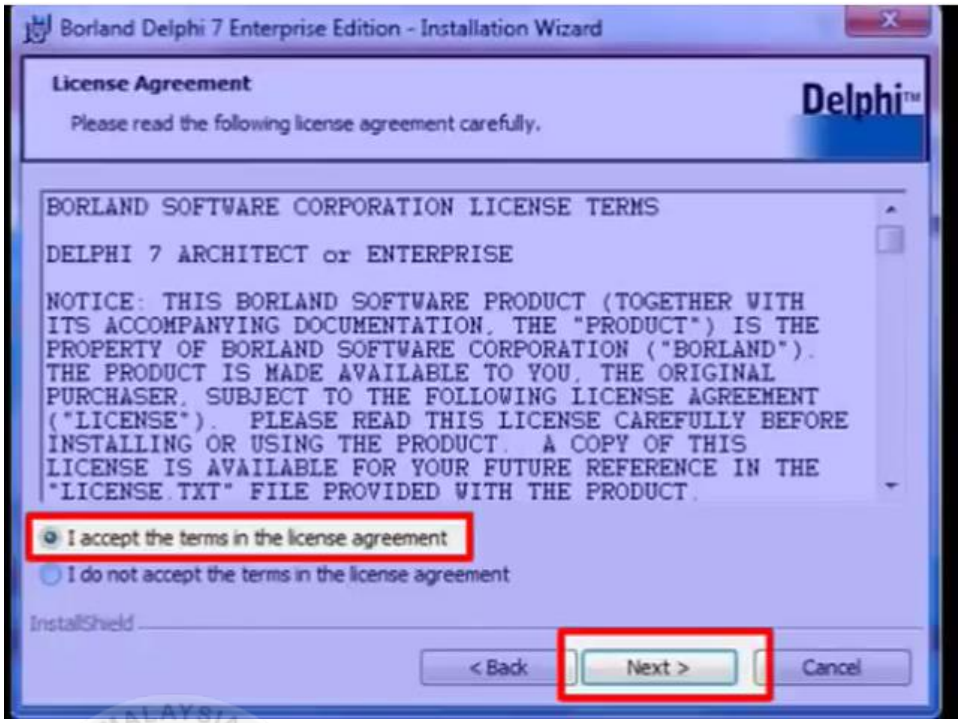



Figure 5.3 license agreement of the software

vi. Choose typical installation and then next.(Figure 5.4)

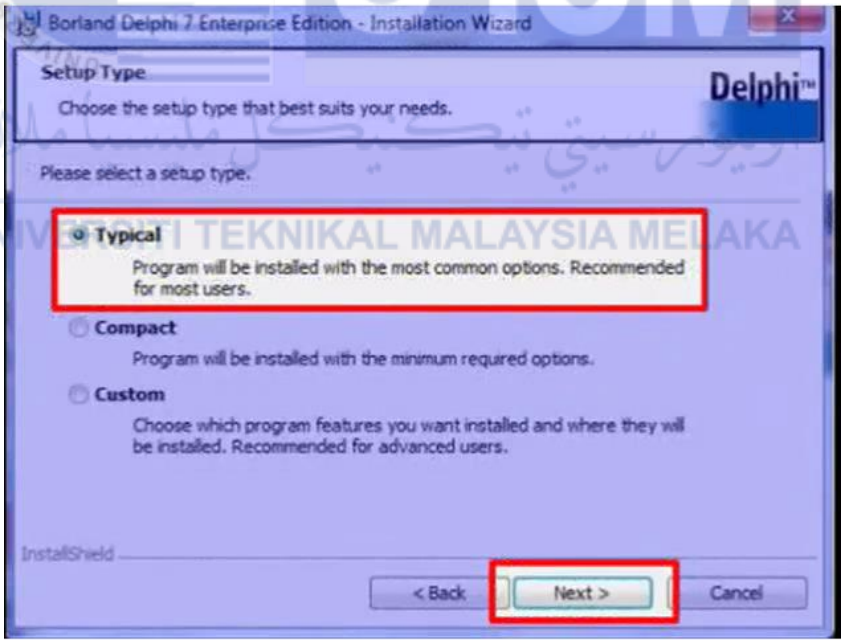



Figure 5.4 setup type of the installation

vii. Set destination folder of the installation.(Figure 5.5)

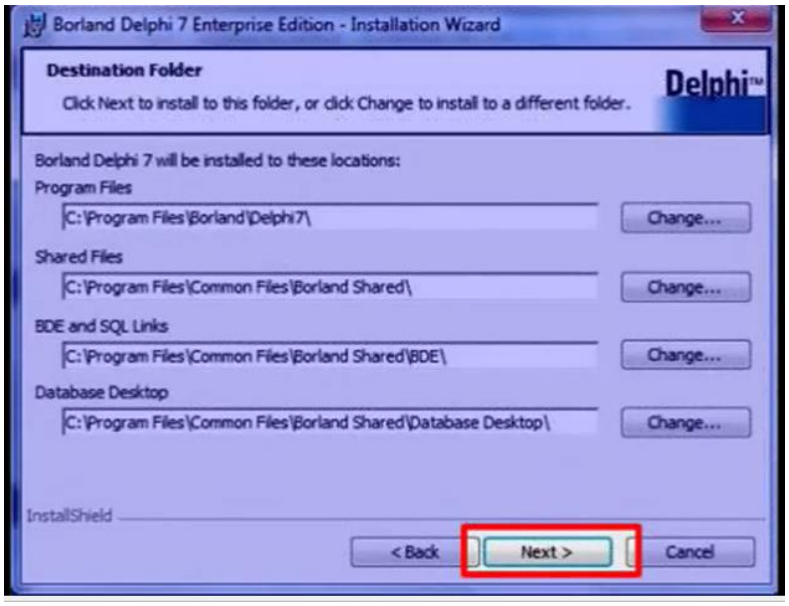



Figure 5.5 destination of the installation

viii. Tick on save the installation database to hard drive and then click next.(Figure 5.6)

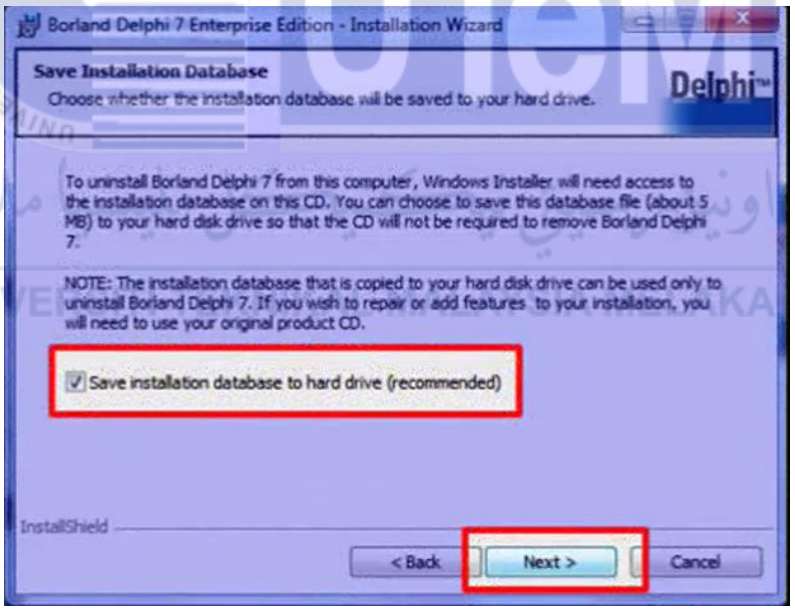



Figure 5.6 save installation database setup

ix. Click install and wait for a few minutes.(Figure 5.7)

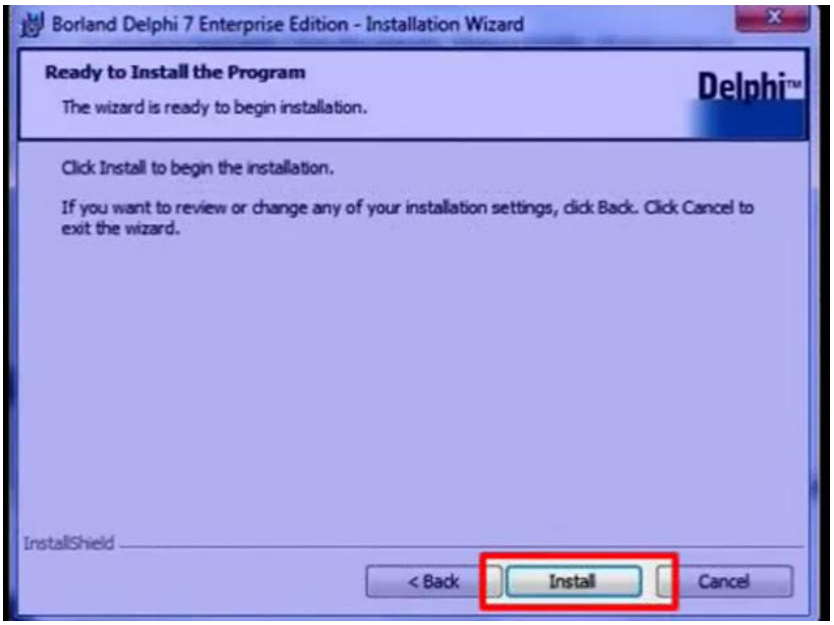



Figure 5.7 installation wizard ready to install the software

x. After the installation finished, click ok and then click Finish.(Figure 5.8 and Figure 5.9)

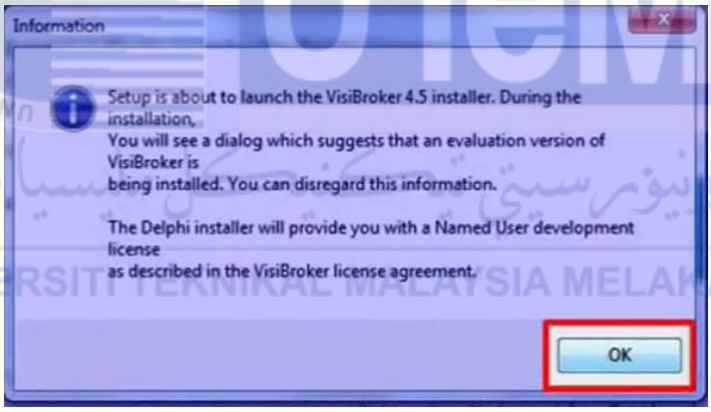



Figure 5.8 installation information of the software

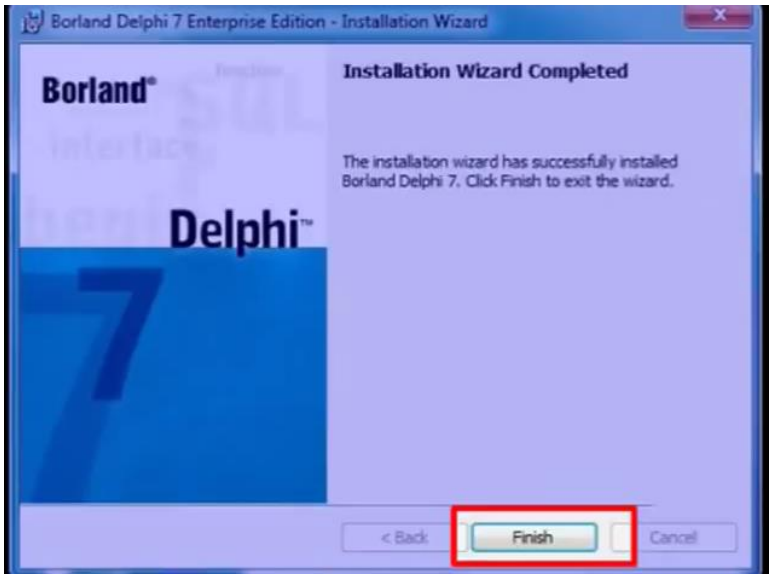



Figure 5.9 installation has finished

### 5.3.2 Installation of Android Studio

i. Download Android Studio exe from https://developer.android.com/studio/index.html

ii. Make sure Java JDK is already installed in the machine. The next step assumed that Java JDK is installed in the machine.

iii. Launch Android Studio.exe. (Figure 5.10)



Figure 5.10 Startup of Android Studio setup

iv. Once you launched Android Studio, it is time to mention JDK5 path or later version in android studio installer.(Figure 5.11)

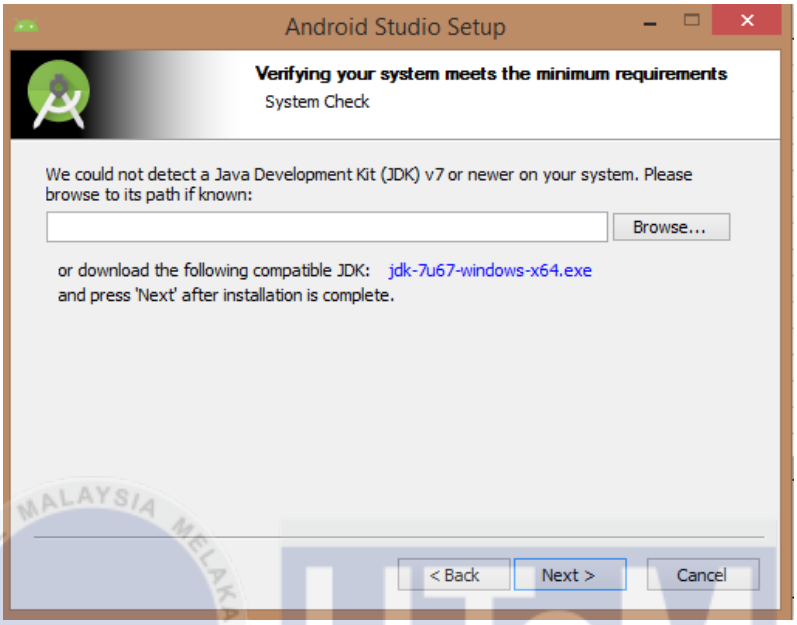



Figure 5.11 Browse for JDK path

v. Initiate the JDK to android SDK. (Figure 5.12)

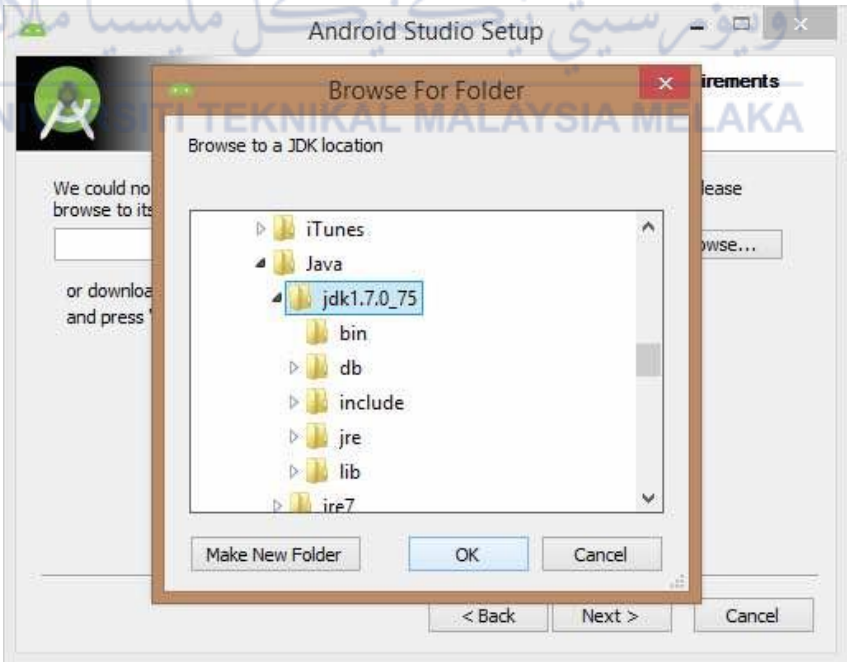



Figure 5.12 Initiation of JDK to android SDK

vi. Check the components which are required to create application. (Figure 5.13)

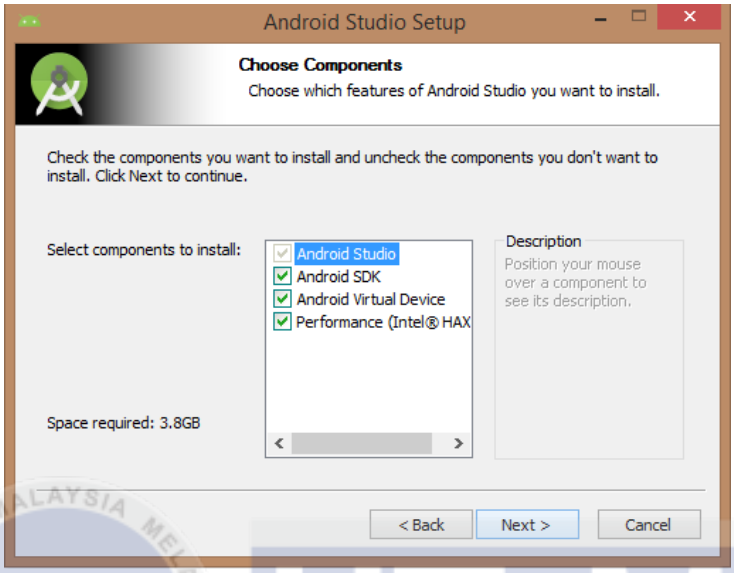



Figure 5.13 Component installation selection

vii. Specify the location of local machine path for Android studio and Android SDK. (Figure 5.14)

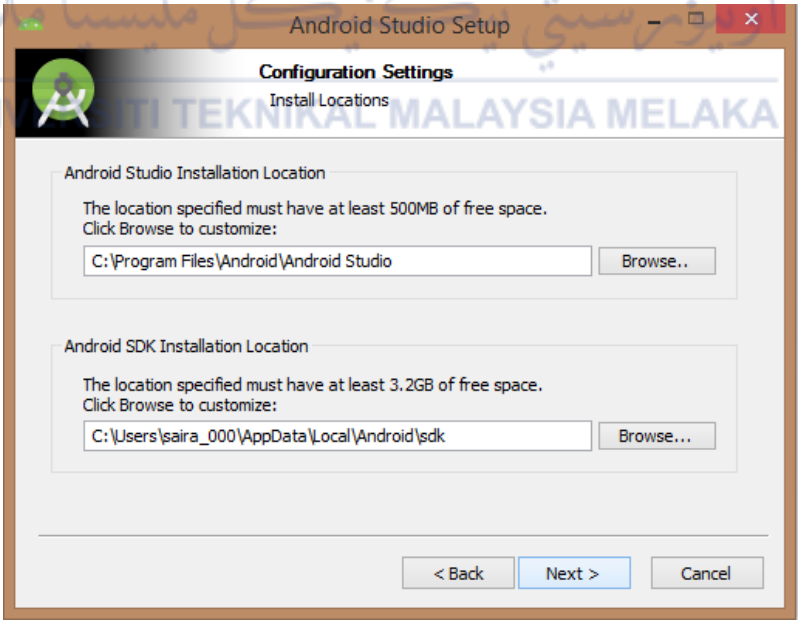



Figure 5.14 Specify local machine path for android

viii. Specify the RAM space for android emulator. By default it would take 512MB of local machine RAM. (Figure 5.15)

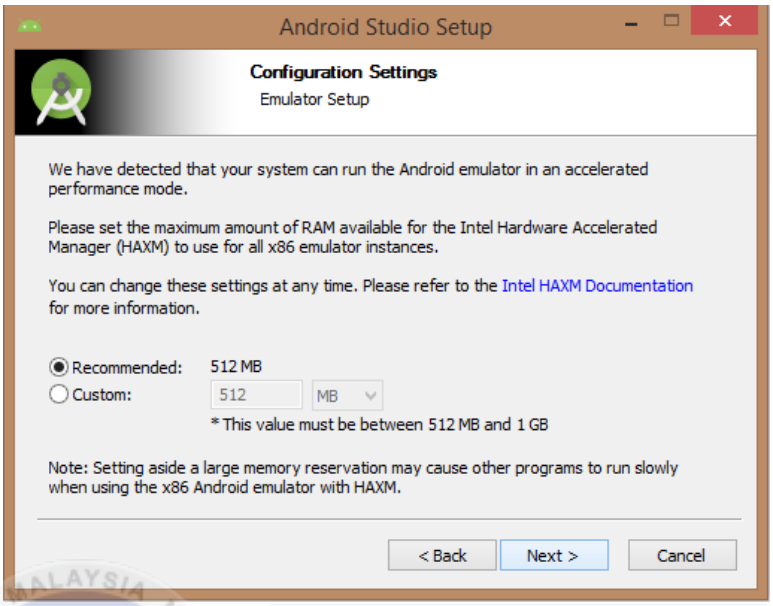



Figure 5.15 Specify RAM for the emulator

ix. At final stage, it would extract SDK packages into our local machine, it would take a while time to finish the task. (Figure 5.16)

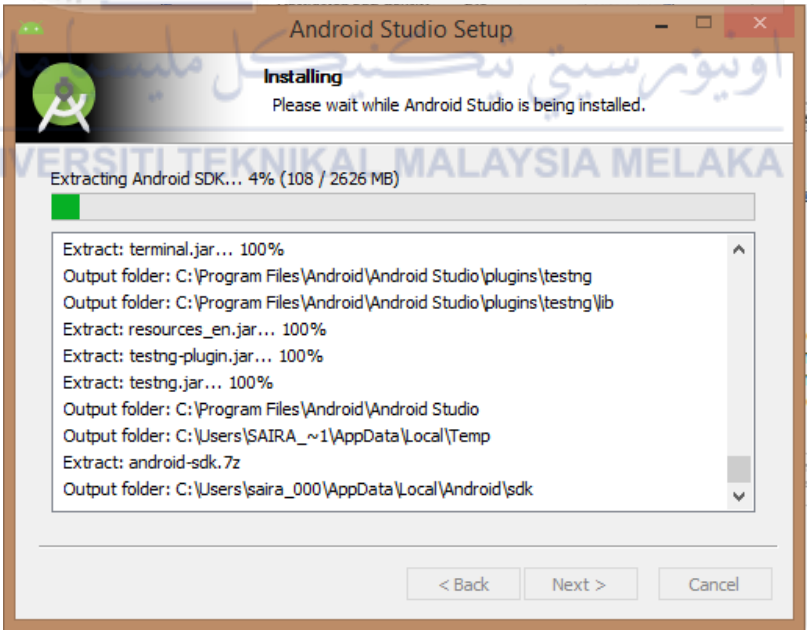



Figure 5.16 Installation of Android Studio

## 5.4 Implementation status

The implementation status established the schedule and needed resource. It define implementation details including programming language, platforms, programming environment and others

Table 5.1: Implementation Status

| Module | Description | Time | Date complete |
|---|---|---|---|
| Login | User login for the system | 2 weeks | 8 FEBRUARY 2016 |
| Device configuration | Configuration of the device used to read MyKad | 1 month | 8 MARCH 2016 |
| Read MyKad | This module read the information of the MyKad | 2 weeks | 22 MARCH 2016 |
| Registration | This module register the visitor and its visitation | 2 weeks | 5 APRIL 2016 |
| Generate QR code | This module save the data of the visit into a QR code | 2 weeks | 19 APRIL 2016 |
| QR code scanner | This module read the information saved in a QR code | 1 month | 17 MAY 2016 |
| Error handling | Makes application harder to crash | 2 weeks | 31 MAY 2016 |

## 5.5 Conclusion

From this chapter, it is shown that the implementation is a very critical process. Every details of implementation need to be recorded for future reference. In order for the application running smoothly, the installation, configuration, testing, and making necessary change must be done carefully. Moreover, implementation phase is critical because it determine whether the project is successful or not.

# CHAPTER VI

## TESTING

### 6.1 Introduction

In software development, the fundamental employment of testing is to recognize mistakes and overcome them. Essentially, testing phase is needed in order to ensure the system created is working properly and error free. There are several type of testing that can be used to test a system such as system testing, unit testing, integration testing and acceptance testing. Testing a system is an important step before the system is being launched. It is because the testing phase is carried out to find any incomplete specification, finding bug using specific tools and test case and to ensure the system are error free, performed and functional as intended before the system can be launched.

## 6.2 Test Plan

Test plan is a document describing the scope, approach, resources, and schedule of intended testing activities. It identifies the test items, the features to be tested, the testing tasks, task responsibility, and any risks requiring contingency planning. The details are given in these following sections:

### 6.2.1 Test Organization

Test organization describes those individual who involves in the testing phase. The individuals are responsible to test each of the system modules. Table 6.1 shows the test organization for Hospital Smart Visitor System Using QR Code Technology.

Table 6.1: Test Organization of Hospital Smart Visitor System

| Testing Activity | Testing Member |
|---|---|
| Unit Testing | MUHAMAD FIRDAUS BIN ABDULLAH |
| Integration Testing | MUHAMAD FIRDAUS BIN ABDULLAH |
| System Testing | MUHAMAD FIRDAUS BIN ABDULLAH |
| User Acceptance Testing | MOHD HADRI AIMAN BIN AFFANDI |

### 6.2.2 Test Environment

Table 6.2 Test Environment for Hospital Smart Visitor system

| Software Configuration | Specification |
|---|---|
| Device Model | ACER |
| Operating System | Windows 10 |
| RAM | 6.00 GB |
| Processor | Intel(R) Core(TM) i3-3217U |
| Database | Xampp Server |

### 6.2.3 Test Schedule

Test schedule consists of testing types, description of testing types, duration, start date and end date of testing of system. Table 6.3 shows the testing schedule of the system.



Table 6.3 Test Schedule for Hospital Smart Visitor System

| Testing Types | Description | Start Date | End Date | Duration |
|---|---|---|---|---|
| Unit Testing | To ensure that each module in the system meets the system requirements. | 11 July 2016 | 25 July 2016 | 2 weeks |
| Integration Testing | To test the integrated system of each module | 26 July 2016 | 2 August 2016 | 1 week |
| System Testing | To test the whole system whether it can function in a proper way or not | 3 August 2016 | 10 August 2016 | 1 week |
| User Acceptance Testing | To test the satisfaction of the end user towards the system | 11 August 2016 | 18 August 2016 | 1 week |

## 6.3 Test Strategy

Several strategies available were bottom-up/top-down approach and black-box/white-box approach. For this project, the test strategies selected are the bottom-up and white-box approaches.

Hospital Smart Visitor System Using QR Code Technology uses bottom-up strategy approach is integration testing. Bottom-up testing requires all components from lower level hierarchy of the system to be tested individually. It will move gradually towards the upper modules of the system. The progress will continue until all the modules of the system are integrated and tested.

### 6.3.1 Classes of Test

#### 6.3.1.1 Functional Testing

Functional testing is primarily is used to verify that a piece of software is providing the same output as required by the end-user or business. Typically, functional testing involves evaluating and comparing each software function with the business requirements.



#### 6.3.1.2 Compatibility Testing

Compatibility testing is to endorse that the application runs properly in different OS and networks successfully. Compatibility test should always perform on real environment instead of virtual environment.

#### 6.3.1.3 Synchronization Testing

Synchronization testing is enabling to solve anticipated timing problems between the testing and the system application. To test the synchronization between the links path of the system function.

## 6.4. Test Design

Test design is the activity where general testing objectives are transformed into actual test conditions and tests design. It is also a set of conditions or variables under which a tester will determine whether a system under test satisfies requirements or works correctly.

### 6.4.1 Test Description

Table 6.4 shows a test description made containing every module in preparation before carrying out test case.



Table 6.4 Sample Test Description for Hospital Smart Visitor System Using QR Code Technology

| Test Case ID | Functional Requirement | Test Case Title | Description | Expected Result |
|---|---|---|---|---|
| D01 | Device connection | Start the system without card reader connected | Test the system when device is not connected | Display “Unable to list reader”. |
| D02 | | Start the system with device connected | Test the system when device is connected | Proceed to login form |

| | | | | |
|---|---|---|---|---|
| L01 | System Login | Login as Admin | Login as admin | Logged as admin and proceed to register heir page |
| L02 | | Login as staff | Login as staff | Logged as staff and proceed to register visitor page |
| L03 | | Login username and password fields are empty | Test the system to login without any username and password | Display “login failed” |
| L04 | | Login using invalid information into the fields | Test the system to login using unregistered information | |
| MY01 | Read Mykad | Read MyKad that is not registered as visitor using the device | Test the system to read unregistered MyKad | Display the IC number in the field but not in the table |
| MY02 | | Read MyKad that is registered as visitor | Test the system to read registered MyKad | Display the Ic number in the field and all the information of the MyKad in the table |
| R01 | Registration | Register new visitor | Test the system to register new visitor | Proceed to MyKad form and display all the information of the MyKad and display “Registration Successful” |
| R02 | | Register already registered MyKad | Test the system to reregister existing information | Display “User already registered. Proceed to visit registration” |
| R03 | | Register heir | Test the system to register heir | Display “heir registered” |
| R04 | | | Test the system to | Display “failed to |

| | | | | |
|---|---|---|---|---|
| | | | registered existing information of heir | register heir” |
| R05 | | Visit registration | Test the system to register visit for registered heir but not the correct patient | Display “registration Failed. You are not the heir to this patient” |
| R06 | | | Test the system to register visit for registered heir to the correct patient | Proceed to QR code form, displaying the QR code for the visitor. |
| R07 | | Limit visitor | Test the system to register visit that ward has reached number of visitation for that day | Display “the limit number of visitation has reached for today”. |
| R08 | | | Test the system to register visit that ward does not reached number of visitation for that day | Proceed to QR code form, displaying the QR code for the visitor. |



### 6.4.2 Test Data

Test data consist of modules, field of modules, valid and invalid data of the testing data.

Table 6.5 Sample Test Data for Hospital Smart Visitor System

| No | Module | Field | Test data | |
|---|---|---|---|---|
| | | | Valid | Invalid |
| 1 | Login Admin | Username | admin01 | Ad min,admin02,admi |
| | | Password | admin01 | 123,zxc,!@# |
| 2 | Login staff | Username | staff01 | Staff,lakakal,admin |
| | | Password | staff01 | staffo1,staff02,!@# |

| | | | | |
|---|---|---|---|---|
| 3 | Register heir | Name | Muhamad firdaus bin Abdullah (All uppercase, all lowercase, mixed upper and lower case) | |
| | | IC number | 940808018989(12 characters no symbols) | 940808-01-8989, 9408080189898989, |

## 6.5 Conclusion

From this chapter, the test plan for this project has been described in detailed. The testing included an assessment of the functionalities of the system are tested from an end-to-end perspective and also to evaluate the complete system the system's compliance against specified requirements.

# CHAPTER VII

## CONCLUSION



### 7.1 Introduction

The flow of whole system that has developed has shown in this report. The documentation concludes all chapters which are literature review, methodology, analysis and design, implementation and testing. In addition, it also shows the strength and weakness of the system. The last section is the suggestion of improvement needed by this system. Lastly, this chapter also depicts whether the project meets the objective and its scopes as cited in early chapter.

### 7.2 Observation on Weaknesses and Strengths

The weakness that has been identified in this project functionality after overall testing and evaluation is:

i. The system required a card reader to access the system functionality although the user not intended to register a visitor.
ii. System is not fully applicable on mobile site.

The strength that has been identified in this project functionality after overall testing and evaluation is:

i. User obtains a QR code containing all the information of the visit.
ii. System validate whether a visitor is allowed or not to visit patient based on patient's heir information.
iii. System limits the number of visitor per day of a ward.

### 7.3 Propositions for Improvement

Suggestions for the improvement of the system:

1 User experience design

Improve interface design to increase user experience satisfaction and readability

2 More development on Mobile application

Improve on the design and functionality of mobile based application

## 7.4 Project Contribution

The project is developed for any hospital in the Malaysia. The project target is to ease the user to handle visitor of the hospital. The system allows limits the number of visitor because the hospital needed a constraint that each type of ward has different limit number of visitor each day. The system increase efficiency in registering visitor, registering patient's heir and controlling the number of visitor.

## 7.5 Conclusion

To conclude based on the objective given. The system has met all the requirement and objective stated. The system is developed as a desktop application. Although some weakness is spotted after evaluation, further observation and improvement may be carry through for improvements.

# REFERENCES

What is Rapid Application Development (RAD)? - Definition from Techopedia. (n.d.). Retrieved April 30, 2016, from https://www.techopedia.com/definition/3982/rapid-application-development-rad

Best Visitor Management Software | 2016 Reviews of the Most Popular Systems. (n.d.). Retrieved April 21, 2016, from http://www.capterra.com/visitor-management-software/

# APPENDICES

## 2.0 Minimum Requirement

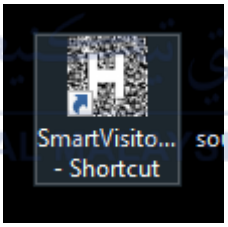
### 2.0.1 Software Requirement

a) Operating system Windows XP and above
b) Android Jellybean 4.1 and above
c) Delphi 7 and above
d) Xampp server or any server

### 2.0.2 Hardware Requirement

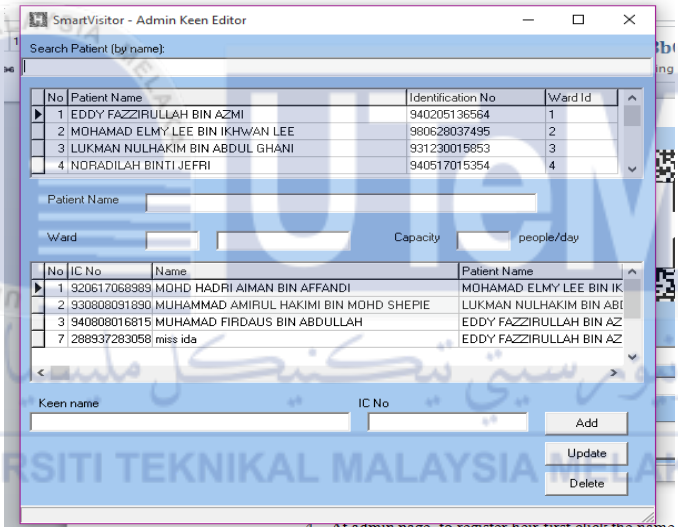
a) Laptop or desktop RAM 6GB or above
b) MD ROCKEY 301 MyKad Reader or any MyKad reader
c) Android smartphone Jellybean 4.1 and above

## 2.1 User Manual

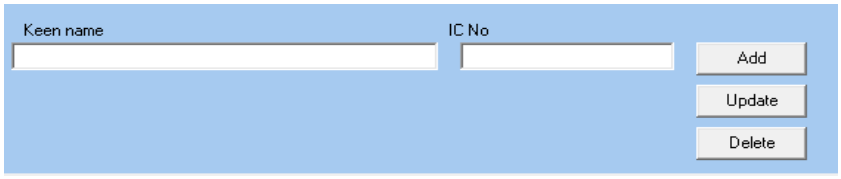



1. Double click the icon of Hospital Smart Visitor System.
2. Please assure that MyKad Reader has been connected to your laptop or desktop

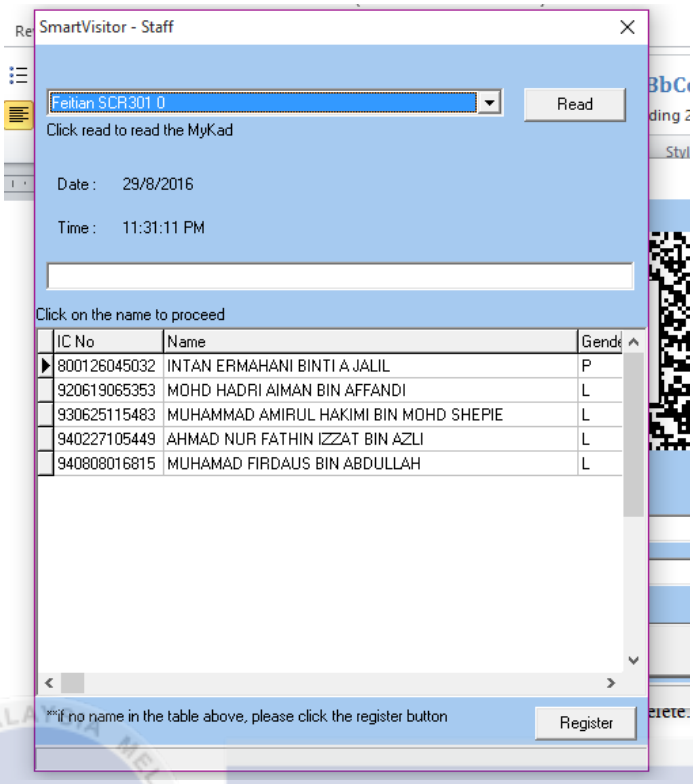

3. When the Login Page pop up, enter “admin01” for username and password to proceed to admin page or “staff01” for username and password to proceed to staff page.



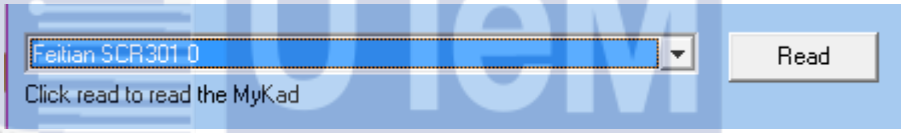

4. At admin page, to register keen first click the name of patient and then enter the information of heir into the field given and click save.



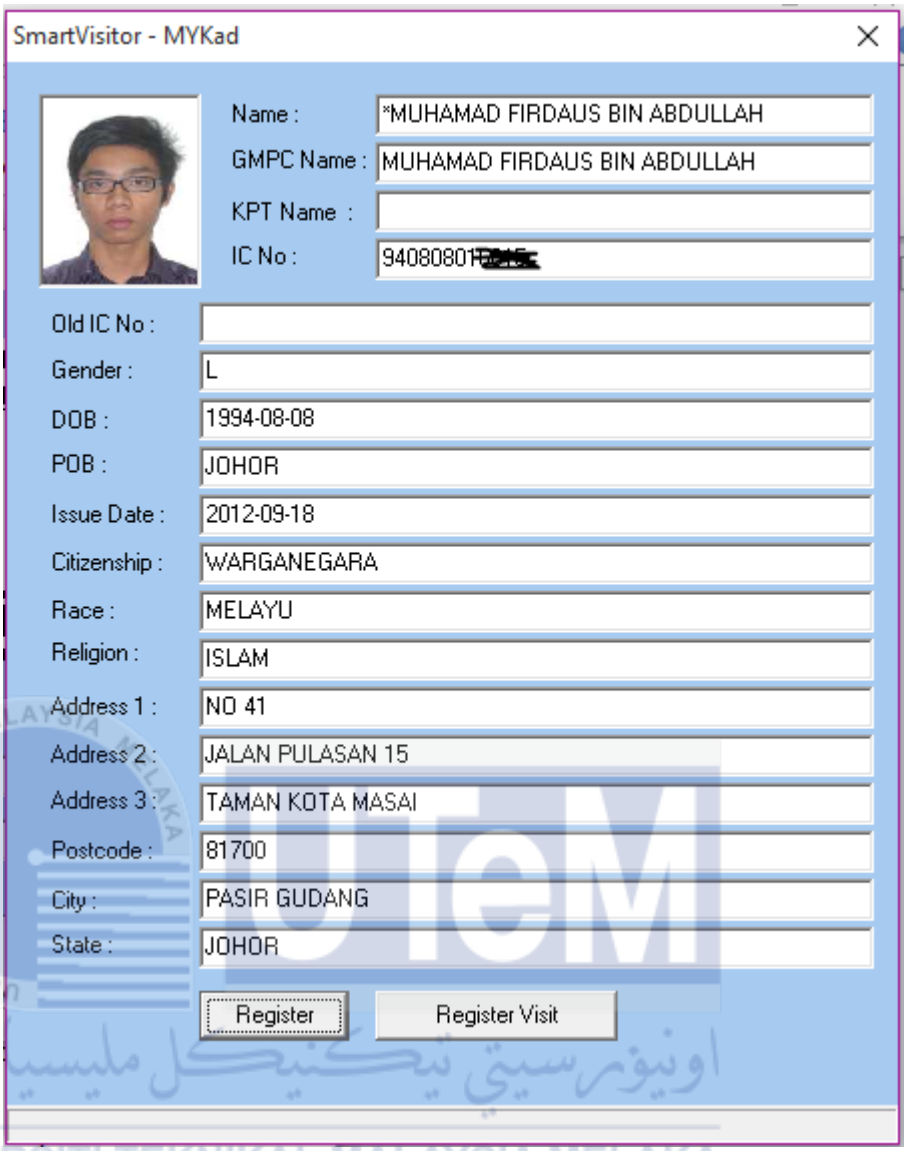

5. To update heir information, first click the name of patient and change the information given in the text field and click Update.
6. To delete heir, click the name of patient and tick the checkbox on the left of the text field of IC number of heir. Then click delete.



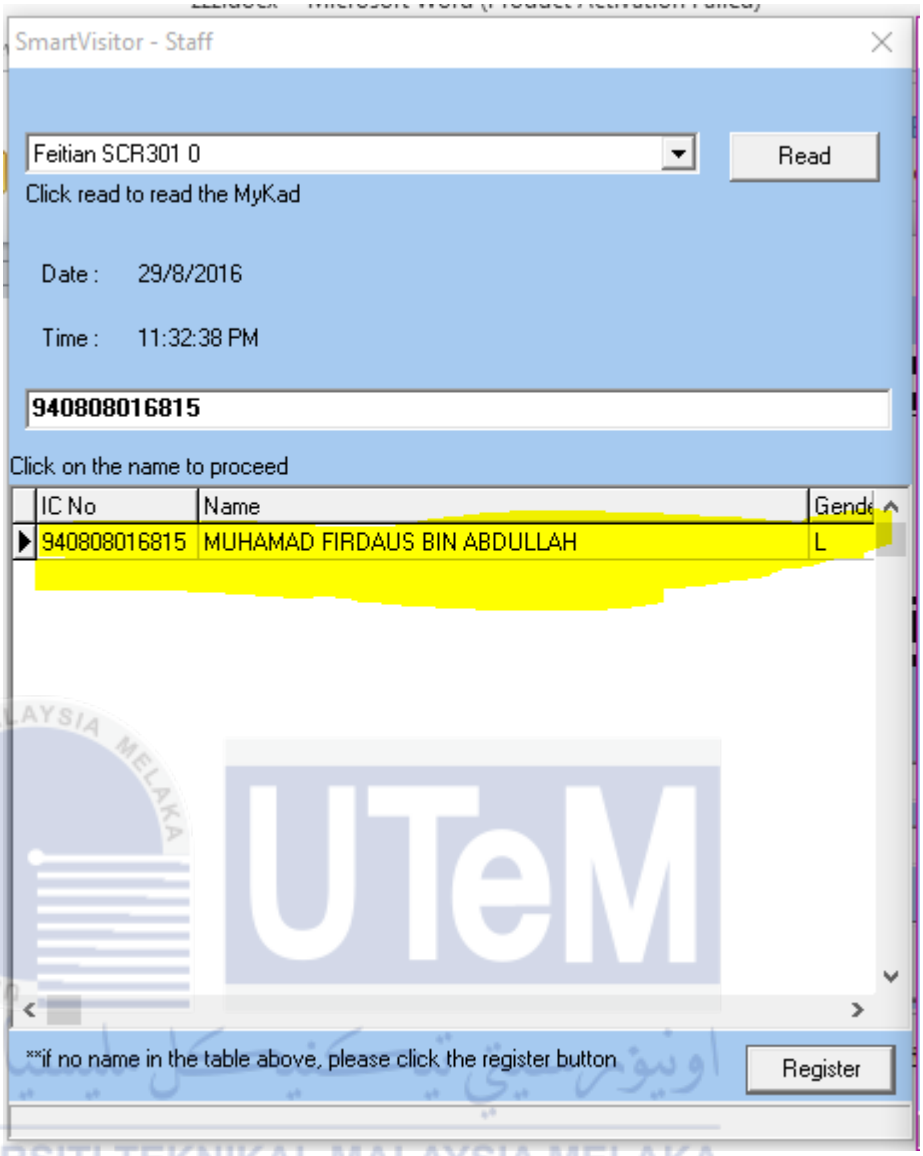

7. At staff page, first insert MyKad into the card reader.




8. Click read on the staff page, and wait for the system to read the mykad.
9. To register the mykad, click register on the bottom of the page.

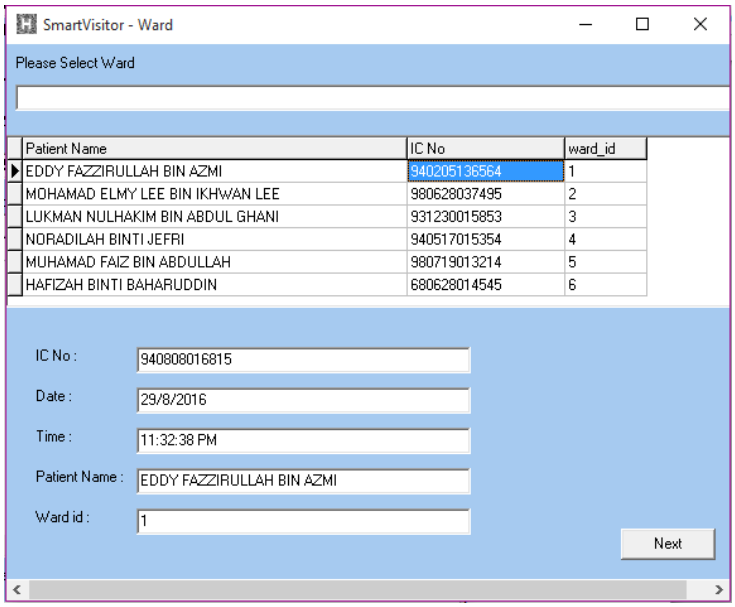



10. The information of the mykad will be displayed and click register at the bottom of the page.

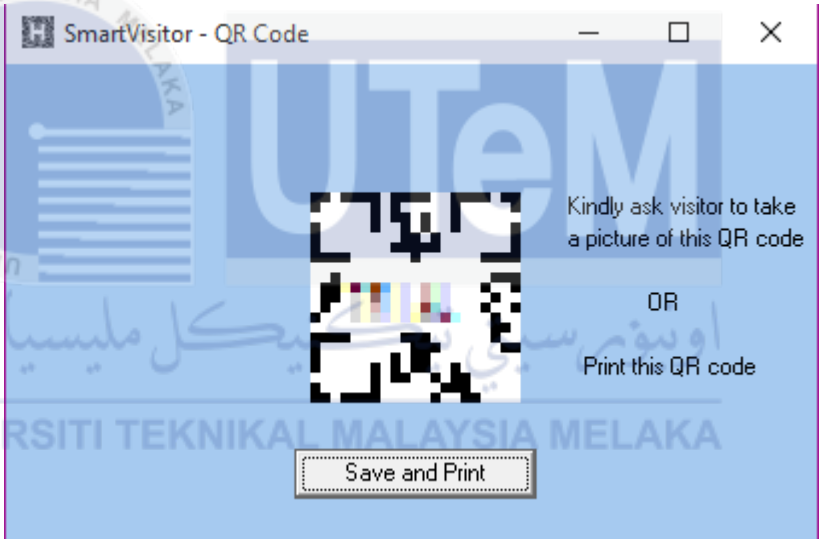





11. To register visit for registered mykad, read the mykad first and then directly click the name of the mykad holder listed at the table.




12. At the patient page, click or search the name of patient and then click next at the bottom of the page.




13. A page containing QR code will appear for the visitor to take picture of the QR code.
14. To continue, click Save and a window will appear to save the QR code into folder of your laptop or desktop.
15. At Mobile based application, a login page will appear and enter the credential for login.
16. Face the camera of the phone to QR code.
17. Information will be displayed.