ISO FILES TRACKING USING NFC DEVICE IN SECURED ENVIRONMENT

ANIS AJMAL BINTI ANUAR

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS

JUDUL: ISO FILE TRACKING USING NFC DEVICE IN SECURED ENVIRONMENT

SESI PENGAJIAN: 2016/2017

Saya ANIS AJMAL BINTI ANUAR mengaku membenarkan tesis Projek Sarjana Muda ini disimpan di Perpustakaan Fakulti Teknologi Maklumat dan Komunikasi dengan syarat-syarat kegunaan seperti berikut:

1. Tesis dan projek adalah hakmilik Universiti Teknikal Malaysia Melaka.
2. Perpustakaan Fakulti Teknologi Maklumat dan Komunikasi dibenarkan membuat salinan untuk tujuan pengajian sahaja.
3. Perpustakaan Fakulti Teknologi Maklumat dan Komunikasi dibenarkan membuat salinan tesis ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. ** Sila tandakan (/)

_____ SULIT (Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia seperti yang termaktub di dalam AKTA RAHSIA RASMI 1972)

_____ TERHAD (Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)

_____ TIDAK TERHAD

_____ _____

(TANDATANGAN PENULIS) (TANDATANGAN PENYELIA)

Alamat tetap:Lot 1378,Kg Belimbing , 17500 Tanah Merah, Kelantan

Dr. Zaheera Binti Zainal Abidin

Nama Penyelia

Tarikh: Tarikh:

ISO FILES TRACKING USING NFC DEVICE IN SECURED ENVIRONMENT

ANIS AJMAL BINTI ANUAR

This report is submitted in partial fulfillment of requirements for the
Bachelor of Computer Science (Computer Security)

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA
2017

DECLARATION

I hereby declare that this project report entitled

ISO FILES TRACKING SYSTEM USING NFC DEVICE IN A SECURED ENVIRONMENT

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

STUDENT : _____ Date : 21/8/2018
(ANIS AJMAL BINTI ANUAR)

I hereby declare that I have read this project report and found this project report is sufficient in term of the scope and quality for the award of Bachelor of Computer Science (Computer Networking) With Honours.

SUPERVISOR : _____ Date : 21/8/2018
(DR ZAHEERA BINTI ZAINAL ABIDIN)

DR. ZAHEERA ZAINAL ABIDIN
Pensyarah Kanan
Fakulti Teknologi Maklumat Dan Komunikasi (FTMK)
Universiti Teknikal Malaysia Melaka (UTeM)
Hang Tuah Jaya
76100 Durian Tunggal, Melaka, Malaysia

DEDICATION

I dedicate this project to God Almighty my creator, my strong pillar, my source of inspiration, wisdom, knowledge and understanding. He has been the source of my strength throughout this program.

I dedicate my dissertation work to my family and supervisor. A special feeling of gratitude to my loving parents, Anuar bin Mahmood and Wan Kamal Arshah binti Tuan Ya whose words of encouragement and push for tenacity ring in my ears. To my brothers and sisters who have never left my side and are very special in my life.

I also dedicate this dissertation to my project supervisor, Dr Zaheera binti Zainal Abidin who has supported me throughout the process. I always appreciate all of you who have involved though out my final year report process and for helping me to complete this project.

ACKNOWLEDGEMENT

I would like to express deepest appreciation and extend my heartfelt gratitude to the person who have made the completion of this project possible; my project supervisor, Dr. Zaheera Binti Zainal Abidin, for her vital encouragement and support. She has continually and convincingly conveyed the spirit of adventure in regard to research and had given us valuable guidance as well as extended encouragement. I also would thank to my family Anuar Bin Mahmood and Wan Kamal Arshah binti Tuan Ya and my institution, Fakulti Teknologi Maklumat dan Komunikasi, Universiti Teknikal Malaysia Melaka without whom this report would have been distant reality.

ABSTRACT

Monitoring and maintaining huge hardcopy files is a tedious tasks in an organization that most files management is done manually. However, the manual process creates data loss, data inconsistency and files misallocation that brings ineffective and insufficient flows to the organization. Thus, a new autonomous files system is highly needed for managing hardcopy files system. In fact, current autonomous files systems available are barcode, QR code and RFID system for files system. Nevertheless, barcode and QR code information still can be copied by third party. In addition, RFID's data privacy is exposed when other user have the same NFC device, he or she can also read the data and tend to scan random tag number. In order to overcome this problem, this study is to improve the security of data transmission. Therefore, tracking using NFC based Device is introduced in Secured Environment created on a static application system for staff and admin in an organization, called as "ISO Files Tracking System". The functions provided by this files system are fully customized based on the problem faced by the staff when using the manual process flow. In fact, in my propose system, the new element of security is applied at the verification phase, which double layer of verification is introduced. The double layer verification involve two steps of tagging that includes user card and file tag. Moreover, the development of this files system uses the open source application such as Visual Studio application, which the file tracking activity would be the main function of this system. The benefits of the ISO files tracking system a)to trace who had taken the file, b)the system requires the staff to login with their ID and password in order to make sure to keep trace who takes the file and c)to identify the location of the ISO file base on the information in the database. Also, to read the information from the tag

using NFC based mobile device. As a conclusion, the significant of the ISO Files Tracking System development helps in enhancing the security in matching method for files tracking in the current location and to provide a convenient working environment.

ABSTRAK

Memantau dan menguruskan fail salinan besar adalah tugas yang memenatkan dalam organisasi yang kebanyakan pengurusan fail dilakukan secara manual. Walau bagaimanapun, proses manual mewujudkan kehilangan data, ketidakselarasan data dan fail disalahletak yang membawa aliran tidak berkesan kepada organisasi. Oleh itu, sistem fail autonomi baru sangat diperlukan untuk menguruskan sistem fail salinan. Sebenarnya sistem fail autonomi semasa yang ada adalah barcode, kod QR dan sistem RFID untuk sistem fail. Walau bagaimanapun, maklumat barcode dan kod QR masih boleh disalin oleh pihak ketiga. Di samping itu, privasi data RFID didedahkan apabila pengguna lain mempunyai peranti NFC yang sama, dia juga boleh membaca data dan cenderung untuk mengimbas nombor tag rawak. Untuk mengatasi masalah ini, kajian ini bertujuan untuk meningkatkan keselamatan penghantaran data. Oleh itu, pengesanan menggunakan peranti mudah alih berasaskan NFC diperkenalkan dalam dan dicipta di dalam sistem aplikasi web untuk kakitangan dan pentadbir dalam organisasi, yang dipanggil "ISO File Tracking System". Fungsi yang disediakan oleh sistem ini disesuaikan sepenuhnya berdasarkan masalah yang dihadapi oleh kakitangan semasa menggunakan aliran proses manual. Malah, dalam sistem cadangan saya, elemen keselamatan baru diterapkan pada fasa pengesahan, yang mana dua lapisan pengesahan diperkenalkan. Pengesahan dua lapisan melibatkan dua langkah penandaan yang termasuk tag pengguna dan fail fail. Selain itu, pembangunan sistem fail ini menggunakan aplikasi sumber terbuka seperti aplikasi Visual Studio, dimana pengesanan fail akan menjadi fungsi utama sistem ini. Keuntungan sistem pengesanan fail ISO a) untuk mengesan siapa yang telah mengambil fail tersebut, b) sistem memerlukan kakitangan untuk

menyediakan dengan ID dan maklumat mereka untuk memastikan untuk menyimpan siapa yang mengambil fail dan c) untuk mengenal pasti Lokasi pangkalan fail ISO pada maklumat dalam pangkalan data. Juga, untuk membaca maklumat daripada teg menggunakan peranti mudah alih berasaskan NFC. Sebagai kesimpulannya, pentingnya pembangunan Sistem Penjejakan Fail ISO membantu dalam meningkatkan keselamatan dalam kaedah yang sesuai untuk pengesanan fail di lokasi semasa dan untuk menyediakan persekitaran kerja yang mudah.

TABLE OF CONTENT

LIST OF TABLE

LIST OF FIGURE

LIST OF ABBREVEATION

RFID	–	Radio Frequency Identification
ISO	–	International Standard Organization
NFC	–	Near Field Communication
GB	–	GigaByte

CHAPTER I

INTRODUCTION

1.1 Introduction

Nowadays, many companies still using manual method to search the ISO file at the ISO room. In fact, the information of the person who take or submit the ISO file need to key in the data into a log book, that lead to data inconsistency, and it is time consuming. However, Current RFID's data privacy is exposed which when other user have that NFC device he or she can also read the data and tend to scan random tag number, and in order to overcome this problem, this study is to improve the security of data transmission. Therefore, this project is to introduce a new method for matching the availability of stock which search the information with NFC based mobile phone. This project is to improve the way of matching the information about file availability with its database and the staff that are on the duty that time being, to reduce the time consume in searching the ISO file availability and to increase the satisfaction when they want to search the ISO file availability. In fact, the new matching method with security mechanism helps to reduce time when searching the ISO File at the ISO room which the staff may not know where the ISO were put, and convenient since the process to search the data is promise smoothness and tend to avoid human mistake that could be stolen or misplace. As a conclusion, this project is expected to produce a new solution in ISO filing system that could be more efficient and higher security using NFC based mobile device.

1.2 Problem Statement

Searching the data of ISO files is suitable by using the current technologies like using RFID matching system. The problems are companies still using manual method to search the ISO file at the ISO room which we do not know where is the current files location. In fact, the information of the person who takes or submit the ISO file need to key in the data into a log book, that lead to data inconsistency, and it is time consuming. Current RFID's data privacy is exposed which when other user have that NFC device he or she can also read the data and tend to scan random tag number

Table 1: Summary of Problem Statement

PS	Problem Statement
PS 1	Companies still using manual method to search and match the ISO files needed.
PS 2	Information of the person who takes or submit the ISO file need to key in the data into a log book, that lead to data inconsistency.
PS 3	Current RFID's data privacy is exposed

1.3 Project Question

Table 2: Summary of Project Question

PS	PQ	Project Question
PS 1	PQ1	What is the suitable method can be used to search and match the ISO files wanted?
PS 2	PQ2	How to key in the data of who take the file to avoid data inconsistency?
PS 3	PQ3	How to secured data?

1.4 Project Objective

The objectives is the process on what do we want to do towards this project. Previous section we have listed the question and the objective we have driven is based on the question we have phrased. Below are the proposed solutions:

Table 3: Summary of Project Objective

PS	PQ	PO	Project Objective
PS1	PQ1	PS2	To identify the location of the ISO file base on the information in the database.
PS2	PQ2	PO2	To read the information from the tag using NFC based device.
PS3	PQ3	PQ3	To design an enhanced security in matching method for tracking the current location of the ISO file for more secured and convenient working environment

1.5 Project Scope

Currently, tracking hardcopy files is carried out manually in some company. Wherein, the employers and employee need to key in their name n log book to save the track on who take the hardcopy file and the improvement to technical way, it's still lack in various type. Therefore this project scope is we implement some security feature like log in to system, and scan the tag, RFID tag attach at the hardcopy file with the scanner, NFC reader. We are focusing on using the NFC technology like NFC reader which we use to scan the tag that stored the data of the hardcopy files. The NFC reader then send the data read to the database to store it so that whoever wants to search the file can track who take the file at ease.

1.6 Project Contribution

Table 4: Summary of Project Contribution

PS	PQ	PO	PC	Project Contribution
PS1	PQ1	PO1	PC1	Propose suitable method to search the current file location
PS2	PQ2	PO2	PC2	Propose new method to key the data of who take the file.
PS3	PQ3	PO3	PC3	New security way to match the data for searching and matching the ISO files

1.7 Thesis organization

Chapter 1: Introduction

This chapter discuss about the background of the project. It defines the problem statement, project question, project scope, project contribution, thesis organization and conclusion.

Chapter 2: Literature Review

This chapter discuss about the preview works that are related to the project, critical review and justification, and proposed solution for further project.

Chapter 3: Project Methodology

This chapter discuss about the methodology used in the project, which explained the selected methodology for each stage and the project milestone.

Chapter 4: Analysis and Design

This chapter discuss about the problem analysis that explained the situation for the project. Requirement analysis such as data requirement, functional requirement, non-functional requirement and other requirement also explained.

Chapter 5: Implementation

This chapter discuss about the software development environment setup, software configuration management and implementation status.

Chapter 6: Testing

This chapter discuss about the test plan, test strategy, test design, test results and analysis.

Chapter 7: Project Conclusion

This chapter discuss about the project summarization, project contribution, project limitation and the future works.

1.8 Conclusion

This chapter explained the introduction about the project. It is use as a guide of the project by defining the problem statement, project objective, scope and others. The next chapter explained about the literature review and the methodology of this project.

CHAPTER II

LITERATURE REVIEW

2.1 Introduction

This chapter is going to discuss about literature review. The aim of this chapter is to review the previous issue and research and current discussion of particular problem related to this project that has been identify by others researcher.

ISO file tracking management is now carried manually which the use of paper still in demand, the staff who take the file still need to fill their detail on the paper when they want to take the file, staff experiencing some difficulties to search the file in the ISO files room and the security implementation still not applied to the current system which lead to misallocation and missing file. Current trend still use barcode to classify the difference of the file which this is not the suitable method to use as said by (R.D.Noble, 2014) that barcode tend to wastage human resource and time consuming in producing the barcode. Current system had used the RFID technology but its' still has many problem as said by (R.D.Noble, 2014) that tagging using RFID tend to read any data from the random tag that it will lead to data inconsistency. In addition, RFID system still not use double verification method which this method promised better security feature if implemented in the system.

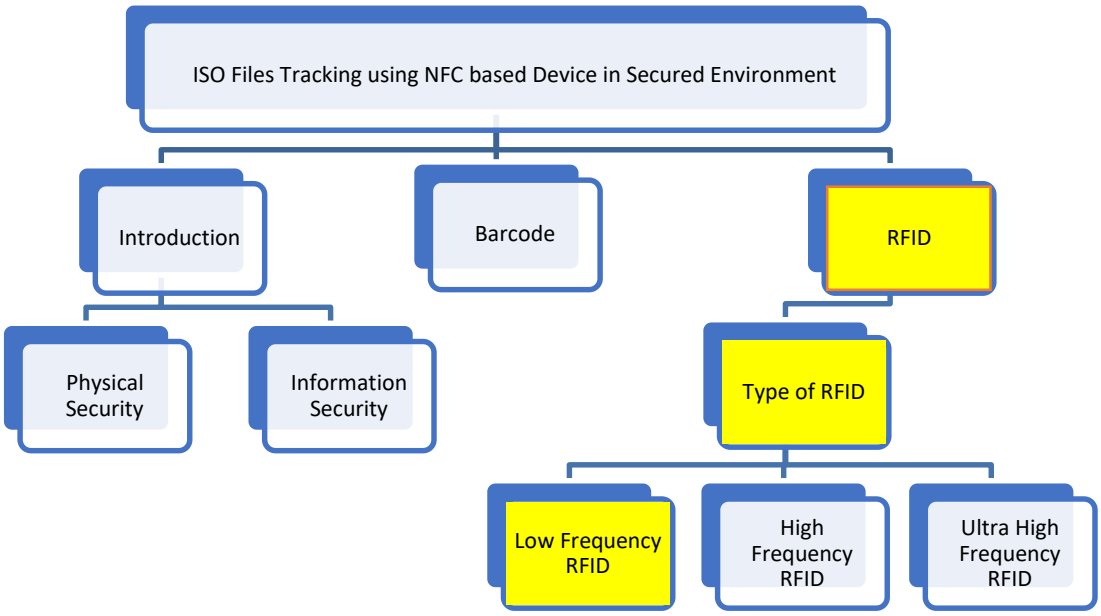


Figure 1 Theoretical Taxonomy of RFID system's flow

In this project that is "ISO Files Tracking using NFC Device in Secured Environment" we used NFC reader as a device that read the NFC tag that tag at the ISO file. This device has its own OS which is Visual Studio Software

Previous researcher (R.D.Noble, 2014) has attempted to scan the RFID's tag to read the database stored on the tag without excluding any possible causes of the increase in error rate occurred while reading the database. The reason for the failure rate is due to the data that is not encrypted that increase the possibility that the scanner read the displayed data and display no data. Recent works have shown that an improved method can solve to reduce error rate on reading the database like encrypting the database so that the reader did not read the bared data or the data read is the correct data that we want to scan. In section 2.3, critical review of current problem of proposed study to be discussed to highlight the important research gap. The proposed solution for project is be made to achieve the aim of the project target.

2.2 Background of study

Nowadays, many companies still using manual method to search the ISO file at the ISO room. In fact, the information of the person who take or submit the ISO file need to key in the data into a log book, that lead to data inconsistency, and it is time consuming. This method also may lead to breach of trust because others may use others identity to key in the information at the log book. This is very unsave method to know who did take the ISO files. Therefore a new autonomous matching environment introduced in ISO file tracking such as barcode, Radio Frequency Identification, RFID and Near Field Communication, NFC.

2.2.1 Barcode

Barcode is a visual representation of information in the form of bars and spaces on a surface. Barcode also is an identification code that contain of a well-defined group of parallel lines aiming easy automatic identification of carried data with endpoint devices such as Point of Sales, PoS terminals, smartphones or computer (Peter Bodnar & Nyul, 2012). Barcodes decode is fast and most barcodes standards provide redundant information for error correction purpose.

There are two types of which is linear barcodes and matrix barcodes (Subramaniam, Hassan, et al, 2013). Linear barcode is the first generation of barcode ever created and it is in one-dimensional that is made up from the lines and spaces that its own specific pattern. While matrix barcode that also known as 2D-barcode that use two-dimensional way to present the information. It is improved from the one-dimensional barcode which it can present data more per unit area.

There are five type of barcode scanner that is use to scan the data spread on the barcode which PenType reader, CCD reader, smartphones cameras, handheld scanner and automatic scanner.

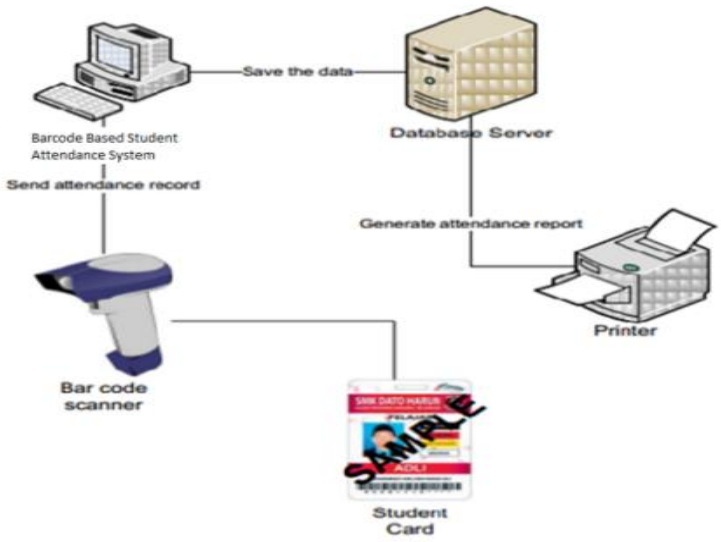


Figure 2 Example on how the Barcode works (Subramaniam et al., 2013)

However, using barcode identification method is not a good idea because barcode can only be read because once the code had been print onto the label. Barcode also (Datta, 2016).

2.2.2 Radio Frequency Identification, RFID

The positioning and use of Radio Frequency Identification (RFID) technology is growing speedily across many unalike industries. Developers put on the technology not only in traditional applications such as asset or inventory tracking, but also in security services such as electronic passports and RFID-embedded credit cards. Radio Frequency Identification (RFID) technology is a non-contact, automatic identification technology that uses radio signals to identify, track, sort and detect a variety of objects including people, vehicles, goods and assets without the need for direct contact as found in magnetic stripe technology or line of sight contact (as found in bar code technology). RFID technology can track the movements of objects through a network of radio-enabled scanning devices over a distance of several meters. There are three difference stages of frequency of RFID which is low

frequency, high frequency and ultra-high frequency. Which this function and read at the difference distance.

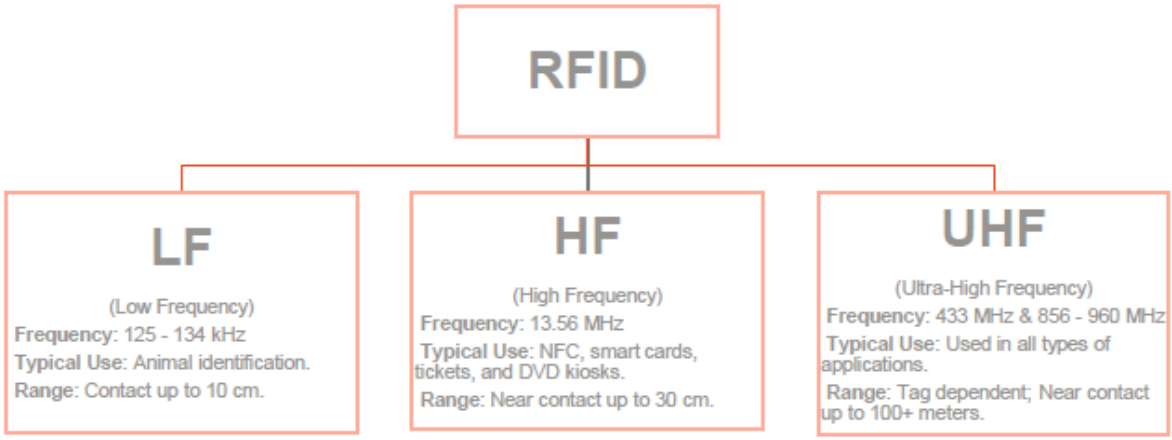


Figure 3 RFID frequency type (Atlas RFID Store, 2012)

The RFID system consists of three elements which is an RFID tag or transponder, RFID tag reader and back-end database which stores record associated with tag information. Each tag contains a unique identity code. An RFID reader emits a low-level radio frequency magnetic field that energizes the tag. The tag responds to the reader's query and announces its presence via radio waves, transmitting its unique identification data. This data is decoded by the reader and passed to the local application system via middleware. The middleware acts as an interface between the reader and the RFID application system. The system then search and matching the identity code with the information stored in the host database or backend system. In this way, accessibility or authorization for further processing can be granted or refused, depending on results received by the reader and processed by the database.

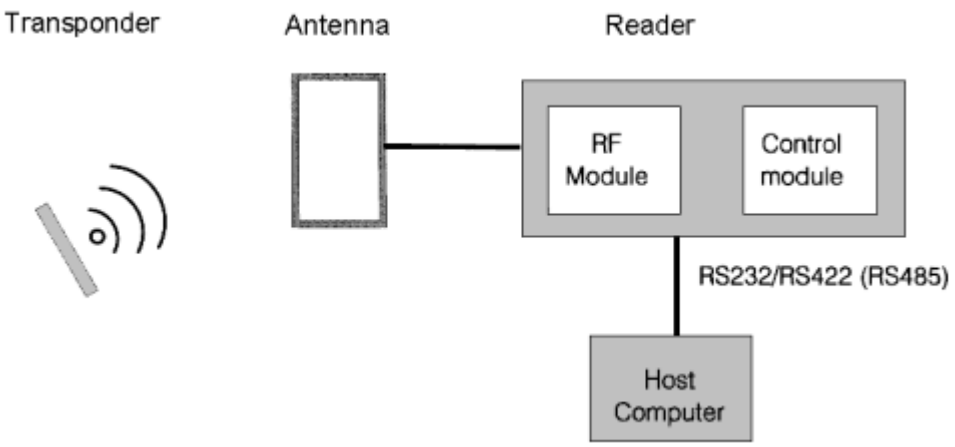


Figure 4 How RFID work

However, RFID technology also raises a number of concerns regarding privacy, security and law enforcement. Current RFID's data privacy is exposed which when other user have that NFC device he or she can also read the data and tend to scan random tag number, and in order to overcome this problem, this study is to improve the security of data transmission. Therefore, this project is to introduce a new method for matching the availability of stock which search the information with NFC based mobile phone. This project is to improve the way of matching the information about stock availability with its database and the staff that are on the duty that time being, to reduce the time consume in searching the ISO file availability and to increase the satisfaction when they want to search the ISO file availability. In fact, the new matching method with security mechanism helps to reduce time when searching the ISO File at the ISO room which the staff may not know where the ISO were put, and convenient since the process to search the data is promise smoothness and tend to avoid human mistake that could be stolen or misplace.

RFID is chosen because it cannot be easily duplicate. It is based on the component content in that RFID which is a small chip that contain it own unique identification and address. Therefore, we use Near Field Communication, NFC technologies to improve it security and make it more secured.

2.2.3 Near Field-Communication, NFC

Near Field Communication, NFC a technology that allow a device to communicate with another at a maximum distance of around less than 10 cm (Curran, Millar, et al, 2012). NFC is based on RFID that used same working principles. An interface technology for short-range data communication working in the frequency band of 13.56 MHz. NFC is standardized in ISO/IEC 18092 and is compatible to ISO/IEC standards 14443 (proximity cards) and 15693 (vicinity cards) and to Sony's FeliCa contactless smart card system. Thus, NFC can be used with existing infrastructures based on the standards mentioned, eliminating the need for a separate NFC infrastructure.

NFC is intended to make it easier and more convenient to make transactions, exchange digital content, and connect electronic devices with a touch. NFC operates at 13.56 MHz and has been developed jointly between NXP Semiconductors formerly Philips Semiconductors and Sony Corporation. Because NFC has the ability to read and write to devices, it is believed that they have a wider use in the future than standard smart cards. NFC involves an initiator and a target. The initiator, as follows from the name, initiates and actively generates an RF signal and controls the exchange of data a payment device where the request is answered by a passive target a Smartphone (Curran, Millar, et al, 2012). The NFC protocol also distinguishes between two modes of communication: active and passive. Active is where both the initiator and target both communicate by generating their own electric fields. They do this in half duplex; deactivating their RF field until no other device is transmitting. In this mode both devices typically have power supplies. Passive mode is more common application in where the initiator is the only device that generates an RF signal, the target device answers that call by modulating the existing field which the initiator device listens out for, and then processes therefore transferring data. The data rates currently supported are 106, 212, 424 or 848 Kbit/s.

A basic principle of the NFC technology is "it's all in a touch". This means that simply touching an object or an NFC device with another NFC device immediately triggers an action. Objects can be equipped with NFC tags. These tags

are used to store content like file name, file type or file id number. The user can access the information on a tag by simply touching it with an NFC device like Samsung Mobile phone that have NFC feature in it. Figure 1 show that the simple way to tell us about how RFID work. As shown on Figure 2 below, its tell us how the RFID system work.

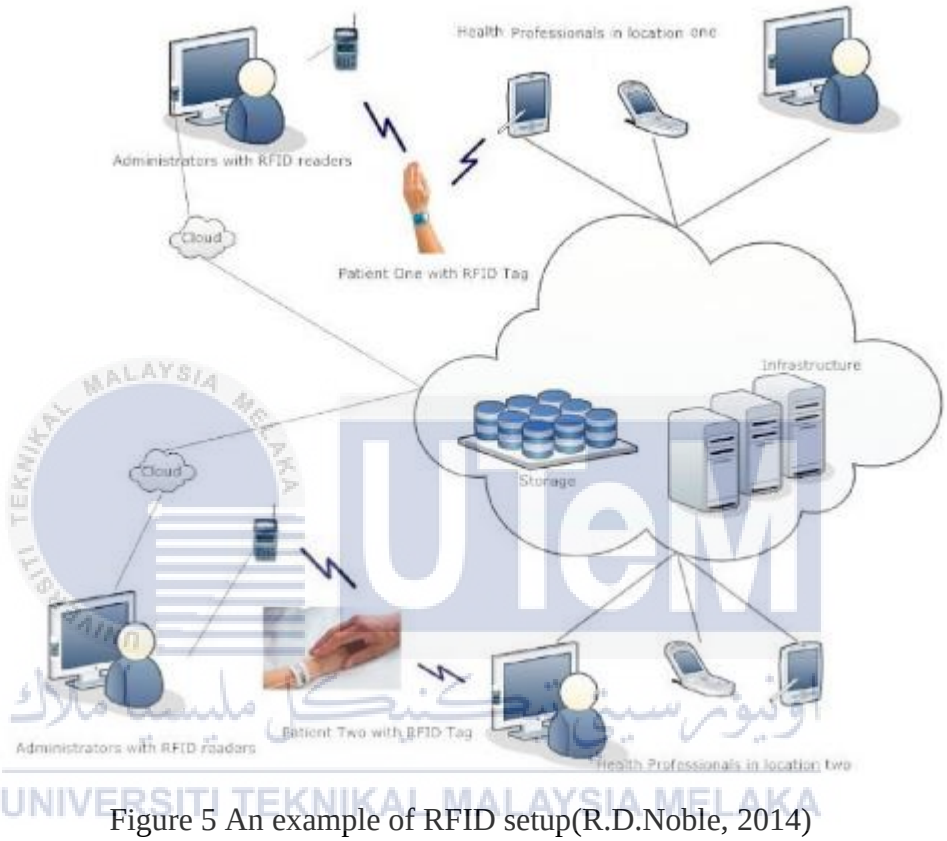


Figure 5 An example of RFID setup(R.D.Noble, 2014)

2.3 Proposed Solution

NFC is the newest way to be used for future world to make our world toward better. NFC is a technology that already have their placement in the market and towards public, but, their usage and uses are not well known and not applicable on the daily use. This is because some are not some are not aware what is the use of this NFC technology. It is also that the NFC use are not expose to the public. As said in the 2.2 background study, that there is some advantage on using NFC.

Thus, for this project purpose is that to use NFC technology. As this this is one of the way to expose to public the advantage and the good on using NFC. This also to enhance the previous work that are currently using RFID based technology. This project are not going to fully replace RFID because NFC is still using the RFID method to fully working. This system require the staff to authenticate themselves first and scan the file taken using the enable system to embed in their smartphone. Thus this can keep track whose taking the file and when the file were took.

2.4 Conclusion

This chapter explained about the literature review which this chapter is about previous project and the research of the previous work related to this project such as how do they manage, what tools do they used and what software were they used. This research is done by reviewing some journal, articles and book which got from online sources like ACM Library, IEEE researchgate and Googlescholar. The proposed solution is used to enhance the old current way. The next Chapter Three explained about the project methodology of the proposed solution.

CHAPTER III

METHODOLOGY

3.1 Introduction

This chapter states method of this project and activity for every stage also described based on the project flow. Project tools and requirements to test the simulation and to implement all the parameters and criteria that have been decided to choose which the best of queuing disciplines is over the network services.

3.2 Project Methodology

The methodology is discussed in this chapter. It acts as a guide to ensure the progress working smoothly in correct steps. The methodology used to help in continuing the next phase in relevant way. It also guided by milestone that mapping the progress implementation to the project. By this, the project is done according to the deadline.

For this project, the method used is according to the waterfall model which includes five important phases which is conception, initiation, analysis, design and implementation. The waterfall model is deriving its name according to the sequential (non-iterative) design process, used in software development processes, in which progress is seen as flowing steadily downwards (like a waterfall) through the phases of project planning, identifying problem and analysis, designing, implementation, testing, and maintenance. In implementing a project, there are various procedures and methods used. The further detail of the phases involved is described in the following section.

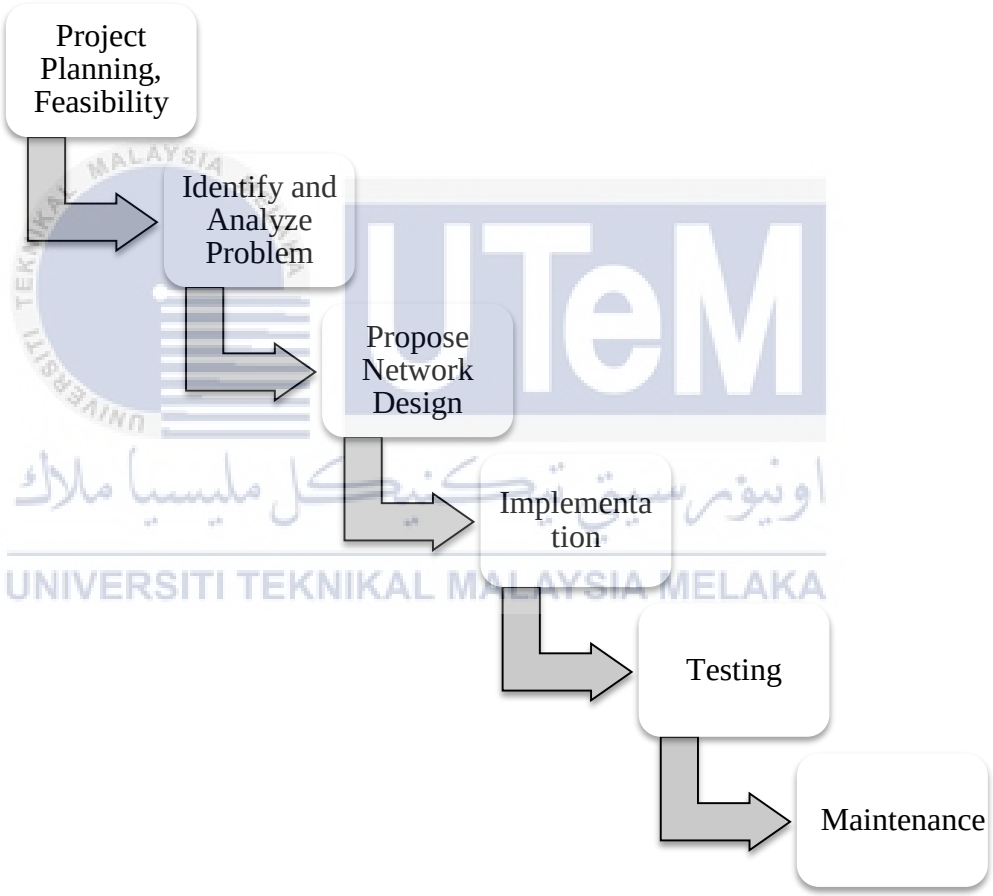


Figure 6 Implementation Cycle for the Waterfall Methodology

Each of the phase shown in the Figure 5 tell the perceptible product or deliverable. The important thing is that each phase concludes the decision making on

implementation.

3.2.1 Project Planning, Feasibility Study

The purpose of phase 1 is to determine the goal to this project and the contribution of this project. The process had to be done is by reviewing the current system if exist and determine the need toward enhancing. This phase also need us to identify and determine which and what hardware are we going to use for the project needs.

1. Hardware

- Advance Card System ACS, NFC card reader
- A set of personal computers, PC
- NFC card

2. Software

- Visual Studio
- SQLite Database Server

3.2.2 Identify and Analyze Problem

In the phase 2, identifying and analyze problem, is the phase where we identify the problem and current problem that we are going to enhance or proposed new method. Moreover, this phase also done to identify who use this ISO file tracking system. The user that is going to use this system is the staff and its admin.

3.2.3 Propose network Design

Based on the analysis conducted, a new system needs to be proposed and design. In this phase, there are something needed to be designed such as network architecture design and the flow design. Also in this phase, we are going to do the selection of the software and hardware that we are going to use. In this phase, we has design the web based application to use at the PC.

3.2.4 Implementation

Implementation is the crucial phase where the system development is conducted. This phase is the longest phase that we are going to focus on. In this phase also, the hardware and software that required to run the system in fully operational. Database in created to store the required data. Also the database is implemented with secure system. The development of system use the hardware and software required which is NFC reader (hardware), a set of workstation which is PC, CPU, keyboard and mouse (hardware), NFC tag(hardware), Visual Studio Software(software), SQLite Database Server (software).

3.2.5 Testing

For the testing phase, unit testing, integration testing, system testing and user acceptance testing is performed. Those all testing is done to ensure the ISO file tracking system using NFC device in secured environment is working properly before we exposed this product.

3.2.6 Maintenance

This phase is done if there are any changes and modification that we want to do after the testing phase. This phase is importance in order to improve the usability of the developed system.

3.3 Project Milestones and Gantt Chart

Project milestone is vital to follow along on every task in the project. Having a project milestone, we can know which arrange we are and what task need to be complete. Table 6 shows the project milestone for this project includes the week, date and activities involved. The table 7 is the Gantt Chart of this project.

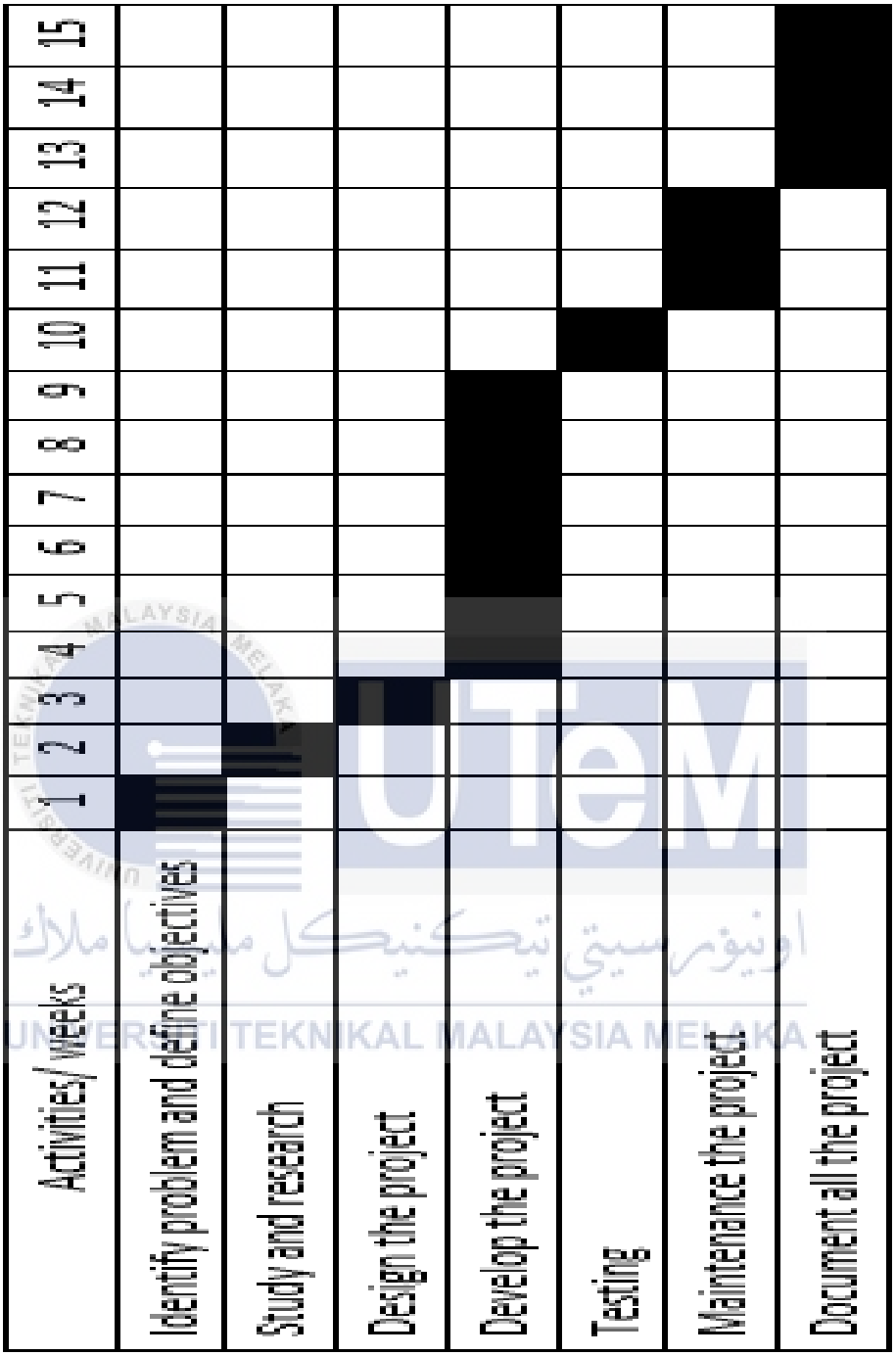
Table 5: Project Milestone PSM 1

Week	Activity
1 (13 Feb-17 Feb)	Proposal PSM: Submission & Presentation Proposal assessment and verification
2 (20 Feb-24 Feb)	Proposal correction/improvement Chapter 1
3 (27 Feb-3 Mar)	Chapter 1 (System development begins)
4 (6 Mar-10 Mar)	Chapter 1 & Chapter 2
5 (13 Mar-17 Mar)	Chapter 2
6 (20 Mar-24 Mar)	Chapter 2 Chapter 3
7 (27 Mar-31 Mar)	Project Demo & Chapter 3 Chapter 4
8 (3 Apr-7 Apr)	Mid semester Break
9 (10 Apr-14 Apr)	Project Demo & Chapter 4
10 (17 Apr-21 Apr)	Project Demo & Chapter 4
11 (24 Apr-28 Apr)	Project Demo
12 (1 May-5 May)	Project Demo & PSM Report
13 (8 May-12 May)	Project Demo & PSM Report Presentation Schedule
14 (15 May-19 May)	Project Demo & PSM Report
15 (22 May-26 May)	Final Presentation

Table 6: Project Milestone PSM 2

Week	Activity
1 (3 Jul-7 Jul)	Chapter 4 Chapter 5
2 (10 Jul-14 Jul)	Chapter 5 Project Demo
3 (17 Jul-21 Jul)	Chapter 5 Chapter 6
4 (24 Jul-28 Jul)	Chapter 6 Project Demo
5 (31 Jul-4 Aug)	Chapter 6
6 (7 Jul-11 Aug)	Chapter 7
7 (14 Jul-18 Aug)	Chapter 7 Project Demo
8 (21 Jul-25 Aug)	Project Presentation

Table 7: Project Gantt Chart



3.4 Conclusion

This chapter explains the methodology on how the overall process of this project is build. The relevant methodology that is used is waterfall method. It consists of six different phases that was more cost effective in term of development and can decrease time needed to design and implement the system. All phases is implemented suited to the face on situation. In the next topic, the design and analysis of the project was reviewed.

CHAPTER IV

ANALYSIS AND DESIGN

4.1 Introduction

The chapter explained about the analysis of the system that is developed and high-level design of the project and the details of file tracking system. The analysis helped to understand the problem-solution relationship and then provide the problem-solving method. The design phase discussed about the high-level design, system architecture and the detailed design of the system with the explanation of the process flow of the whole system that being developed.

4.2 Problem Analysis

Current file tracking system is consisting still using manual method to search the ISO file which we do not know where the current files location is. Current file tracking system start from staff writing their name on the log book to record the name and then they can literally take this file directly from the file room, companies still using manual method to search the ISO file at the ISO room which we do not

know where is the current files location. In fact, the information of the person who takes or submit the ISO file need to key in the data into a log book, that lead to data inconsistency, and it is time consuming. Current RFID's data privacy is exposed which when other user have that NFC device he or she can also read the data and tend to scan random tag number. NFC technology has become a thing that some had already used to make their management easier. Therefore, for this project NFC technology is used to enhance the current method and its security part.

4.3 Requirement Analysis

Requirement analysis give the details about each of the software and hardware that is used in this project. Section 4.3.1 explain about the software requirement, while section 4.3.2 explain about the hardware requirement for this proposed method.

4.3.1 Data Requirement

The input of this product is the NFC Reader that has been configure in Visual Studio and can read the RFID tag. The reader could read the data from database and display the user details in interfaces.

4.3.2 Other Requirement

4.3.2.1 Software Requirement

The software requirement for this system is by using Visual Studio for the

interface and algorithm implementation and others related workstation used in this project.

Table 8: Software Requirement for Building This System

Software	Description
i) Microsoft Visual Studio 2012 	Cross-platform toolbox for programming of file tracking experiments
ii) SQLite Database Server 	Cross-platform toolbox for database creation
ii) Windows 7 	Workstation for software installment setup Workstation for documentation
iii) Microsoft Office Word 	Software to make full report documentation
iv) Microsoft Visio 	System flow work generator

4.3.2.2 Hardware Requirement

PC

The hardware requirements for this prototype are a workstation with a good performance. Workstation was used as a platform to implement the system and to do the implementation phase. Below is the specification of the workstations.

Table 9: PC Specifications

Hardware specification	**Descriptions**
Manufacturer	HP
CPU	Intel Core i5-3470 / 3.20 GHz
Max Turbo Speed	3.20 GHz
Number of Cores	Quad-core
64-bit Computing	Yes
Chipset Type	Mobile Intel HM65 Express
Max Supported Size (Memory)	8 GB
Memory Speed (RAM)	1066 MHz
Display	LED backlight
Widescreen	Yes
Graphic Processor	
Wired Protocol	Gigabit Ethernet
Data Link Protocol (Networking)	Bluetooth, Ethernet, Fast Ethernet, Gigabit Ethernet, IEEE 802.11b, IEEE 802.11g, IEEE 802.11n
Wireless LAN supported	Yes

Laptop

Laptop is used to document all the documentation phase. Below is the specification of the workstations.

Table 10: Laptop Specifications

Hardware feature	**Descriptions**
Manufacturer	Asus
CPU	Intel Celeron CPU 10070 1.50 GHz
Max Turbo Speed	3.2 GHz
Number of Cores	Dual-Core
64-bit Computing	Yes
Chipset Type	Mobile Intel HM76 Express
Max Supported Size (Memory)	16 GB
Memory Speed (RAM)	1600 MHz
Display	LED backlight
Widescreen	Yes
Graphic Processor	Intel HD Graphics 4000
Wireless Protocol	802.11n, Bluetooth 4.0
Wired Protocol	10/100 Ethernet
Data Link Protocol (Networking)	Bluetooth 4.0, Ethernet, Fast Ethernet, IEEE 802.11b, IEEE 802.11g, IEEE 802.11n
Wireless LAN Supported	Yes

NFC Reader

This hardware used to read the NFC tag data contained. It also used to encode data into the NFC tag. Below is the specification of the workstations.

Table 11: NFC reader specification

Hardware feature	Description
Manufacturer name	ACR122U-A9
Dimension	98.0 mm (L) x 65.0 mm (W) x 12.8 mm (H)
Weight	70.0 g
Interface	USB Full Speed
Operating distance	Up to 50 mm (depends on the tag type)
Supply voltage	Regulated 5V DC
Supply current	200mA (operating); 50mA (standby); 100mA (normal)
Operating temperature	0-50 °C
Operating frequency	13.56 MHz
Smart card interface support	• ISO14443 Type A & B • MIFARE • FeliCa • 4 types of NFC (ISO/IEC18092) tags
Compliance	ISO 18092, ISO 14443, PC/SC, CCID, EN60950/ISO 60950, CE, FCC, MIC, KC, VCCI, RoHS 2, USB Full Speed, Microsoft® WHQL
Operating system support	• Windows® • Win CE 5.0 and 6.0 • Linux® • Mac OS® • Android™ 3.1 and above

NFC tag

NFC tag used to store the data of ISO file. It is attached to the hardcopy ISO file. Below is the specification of the workstations.

Table 12: NFC tag specification

Hardware feature	Description
Name	Wristband Mifare ultralight
Total memory	The total memory of the Tag. Part of it, however, is not writable, as required for some functions, 64 bytes
Available memory	The actual memory you have for writing data on the NFC Tag. 48 bytes, 48 bytes
URL length	The maximum number of characters that a link on this Tag can contain, net of the 'http://www.'. 41 characters
Text length	The maximum number of characters that you can write on this NFC Tag, 39 characters
NFC forum type	Compatibility with the technical specifications drawn up by the NFC Forum Type 2
Cryptography	A safety feature on the chip, which can help prevent the cloning is an advanced feature that requires technical skills, but not necessary for standard use, No
Serial number	The Tag contains a unique ID, called UID., Yes

4.4 High level design

4.4.1 System Architecture

System architecture is designs that are used to define the system in a certain area. It is very important stage in designing a system as it can to make simple mistake on implementing the system.

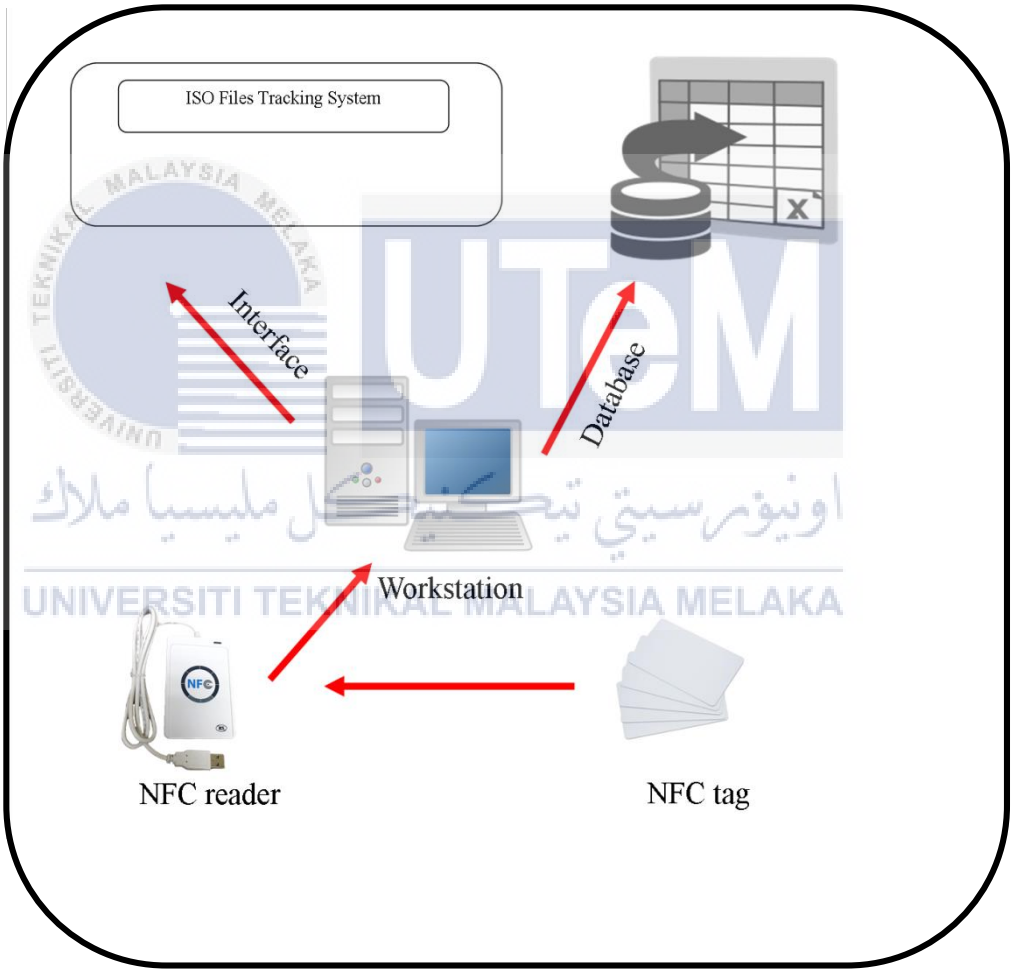


Figure 7 Design Architecture

Based on the figure 6 above, workstation used to store the database and the output interface of the system. The user card have to tag to NFC reader to take the hardcopy

file, it is because all insider hardcopy files details is stored in database and the NFC reader can detect the ID of the hardcopy files card.

4.4.2 Conceptual Design

In this section, figure 7 shows Entity Relationship Diagram (ERD) that has been developed.

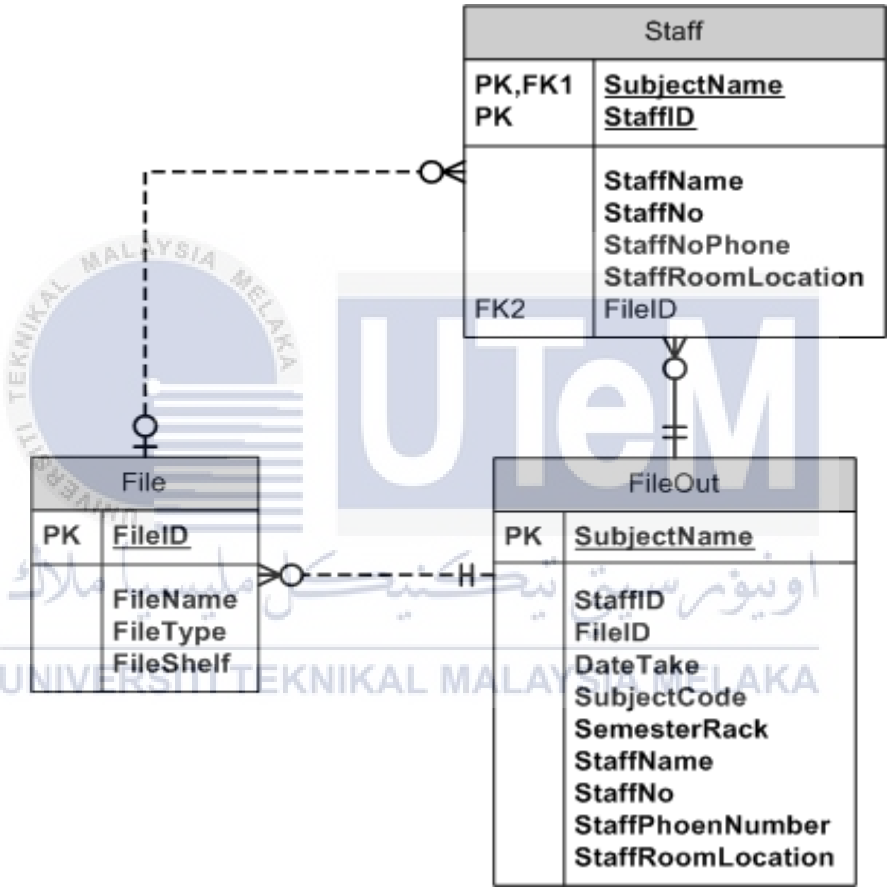


Figure 8 ERD for this tracking system

4.4.3 User Interface Design

This section discuss about the user interface design of the system. This section is focusing on the output display for the user to use.

MAIN PAGE OF ISO FILE TRACKING SYSTEM

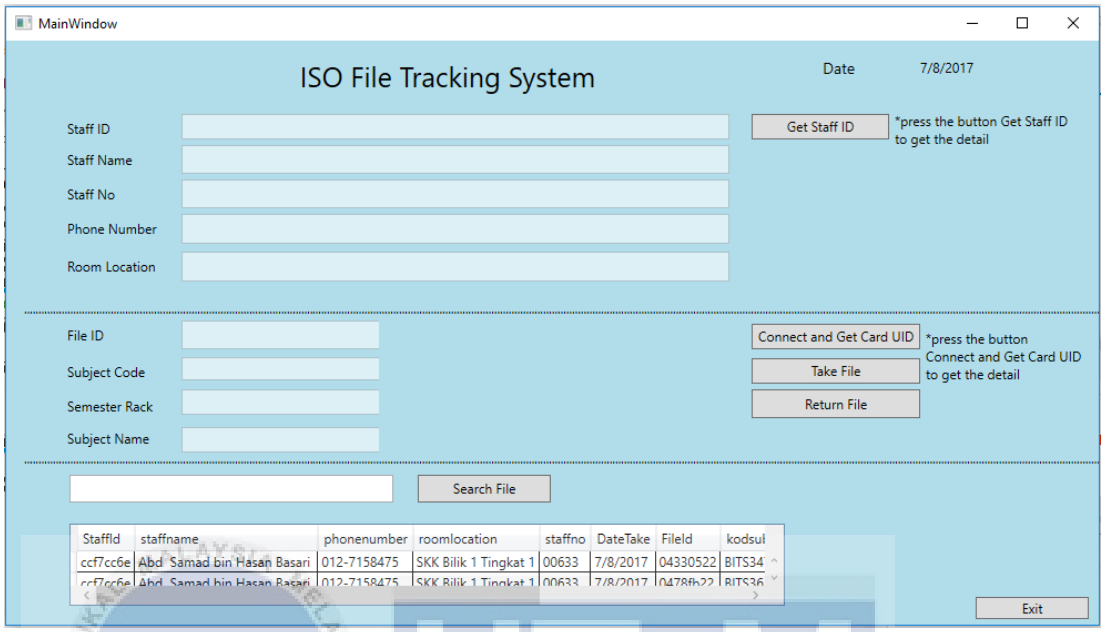


Figure 9 Main Page Interface

4.5 Flow Chart

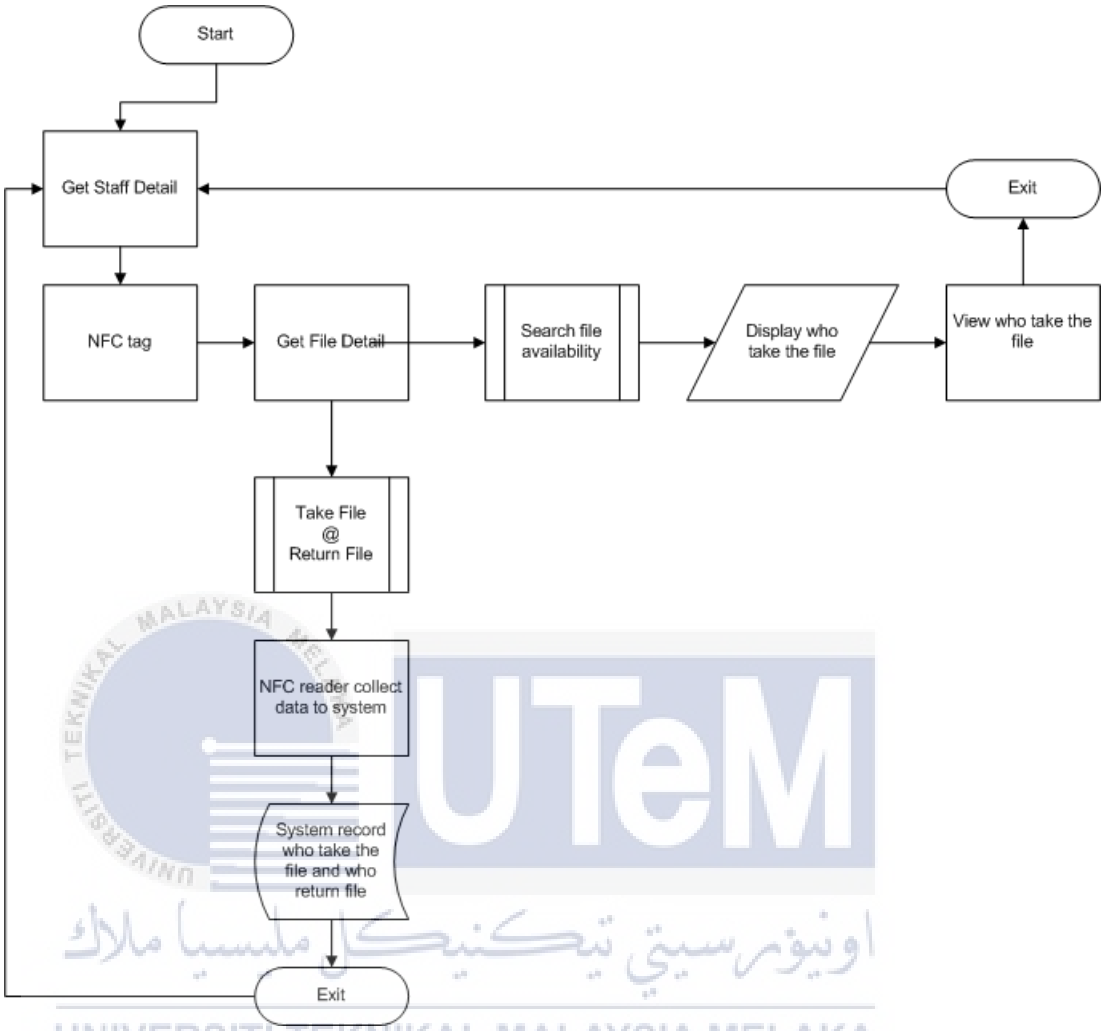


Figure 10 Full System Flow Chart

4.6 Conclusion

This chapter has reviewed a designed that covered all the process of this project which is analysis for the whole project. The problem statement is analyzed to discover more about the future work and logic algorithm that being used in this system. The suitable setup requirement is used to make the progress of the system can be complete in particular given time. The interface can produce a good build in blend with the pseudo code implemented to the system. In the next chapter, the implementation of analysis of iris recognition system was discussed.

CHAPTER V

IMPLEMENTATION

5.1 Introduction

This chapter tells the detail about the implementation phase on the project. The setup and configuration management explained to give in detailed about on how the project work.

5.2 Project Development Environment Setup

This section describes the overall development environment of the project which covers the following sub-topic:

i. PC Environment Setup

This section describes the software related that have been used on this project including Visual Studio. Visual studio is from Microsoft which is an integrated development environment (IDE). This software used to

build computer programs such Microsoft Windows, web sites, web apps, mobile apps and web services. It use a Microsoft software development platform such as Windows API, Windows Forms, WPF Application and Microsoft Silverlight. Visual Studio supports 36 different programming languages including C, C++, VB.NET and C# which is used to build ISO File Tracking System.

ii. RFID Environment Setup (ACR122-NFC)

For this environment setup, it describes on how the NFC Reader is set to be integrated with the Visual Studio. The configuration need to be done to tag the RFID tag.

5.2.1 PC Environment Setup

This section describes all things that related to this area including SQLite Database Server. The SQLite Database Server is graphical desktop server to develop the this system database. Hardware requirement for PC environment is that had been used is shown below:

Table 13: PC Environment Setup

No.	System Configuration	Specification
1	Operating System	Windows 10
2	Hardware	Laptop : ASUS Processor : Intel ®Celeron® CPU 1007U @ 1.50GHz 1.50 GHz RAM : 2GB Hard Disk Space : 500GB
3	Software	• SQLite Browser(add on Mozila Firefox)

		• Visual Studio 2012

5.2.2 RFID Environment Setup (ACR122-NFC)

In this section, it describes on how the NFC Reader is set to be integrated with the Visual Studio. The configuration need to be done to tag the RFID tag. Detail implementation is implemented as below:

Figure 11 NFC Setup

For NFC reader direct connect it to the USB port at the laptop. To make sure it is properly connected to the laptop can be make sure by see the LED light on the reader are switch on.

5.3 Project Configuration Management

This section defines the general configuration management for the project which cover below sub-topics:

i. PC Configuration

PC configuration is to explain the step to setup the PC needs in order to build up the project. The configuration include the installation of SQLite Database Server.

a) SQLite Database Installation
b) Visual Studio Integration with SQLite Database Server Configuration

ii. ACR122U Configuration

This section explain the script that is used to connect the reader to the Visual Studio and to run the project.

a) ACR122-U integration

5.3.1 PC Configuration

a) SQLite Database Installation

Step 1: Download the SQLite Database Server extension from the below site:

https://sourceforge.net/projects/sqlite-dotnet2/files/latest/download?source=files

Step 2 : Run the extension. Choose ‘Next’

Figure 12 SQLite Installation

Step 3 : Choose ‘Next’

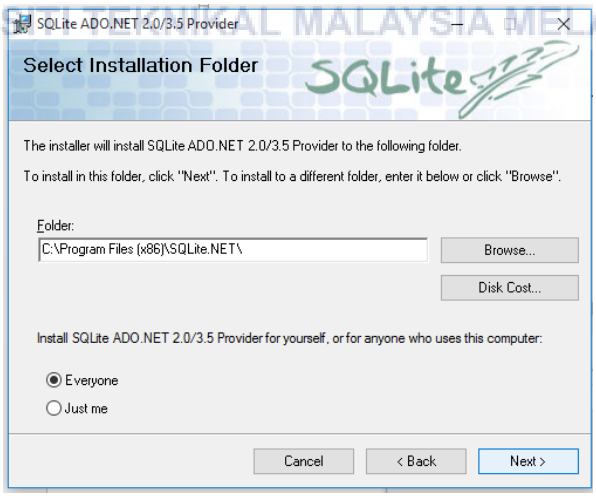


Figure 13 SQLite Installation

Step 4: Choose ‘Next’

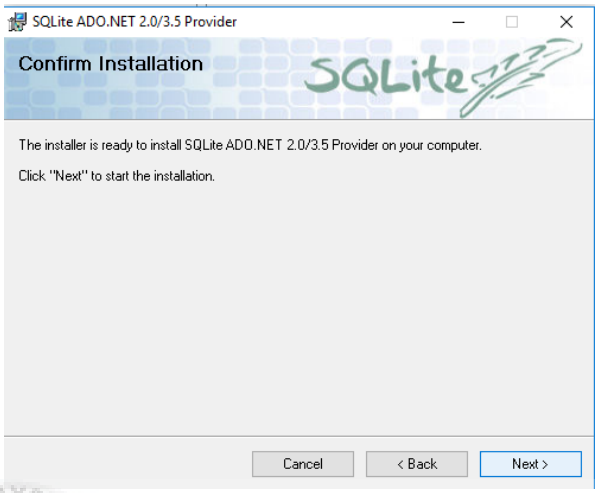


Figure 14 SQLite Installation

Step 5: Choose ‘Close’

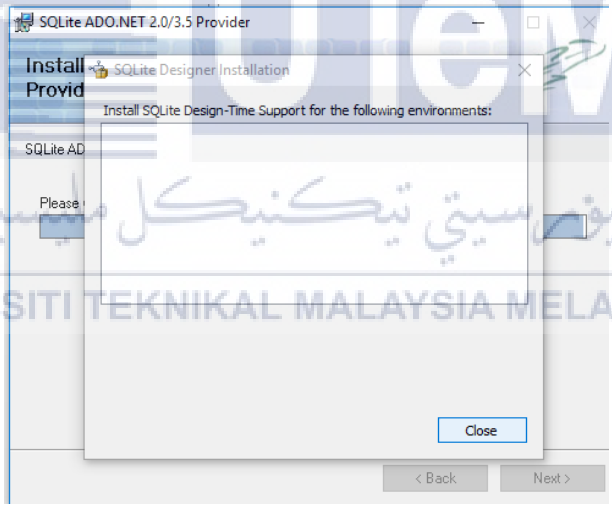


Figure 15 SQLite Installation

Step 6: Choose ‘Close’

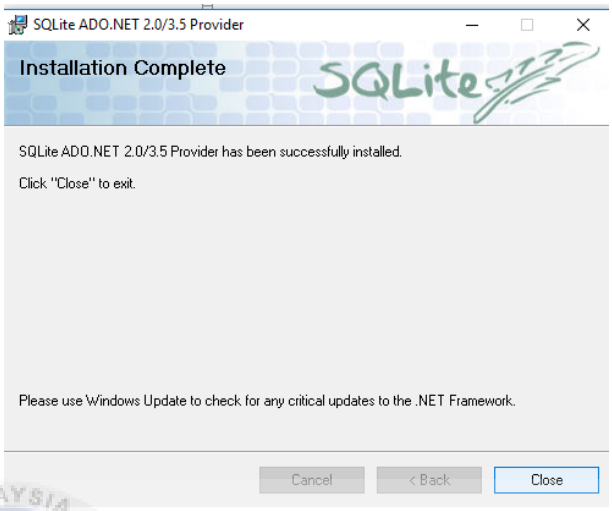


Figure 16 SQLite Installation

b) Visual Studio Integration with SQLite Database Server Configuration

Step 1 : Open Visual Studio 2012 and do the task as figure shown below. Right click on the ‘Reference’ and choose ‘Add Reference’

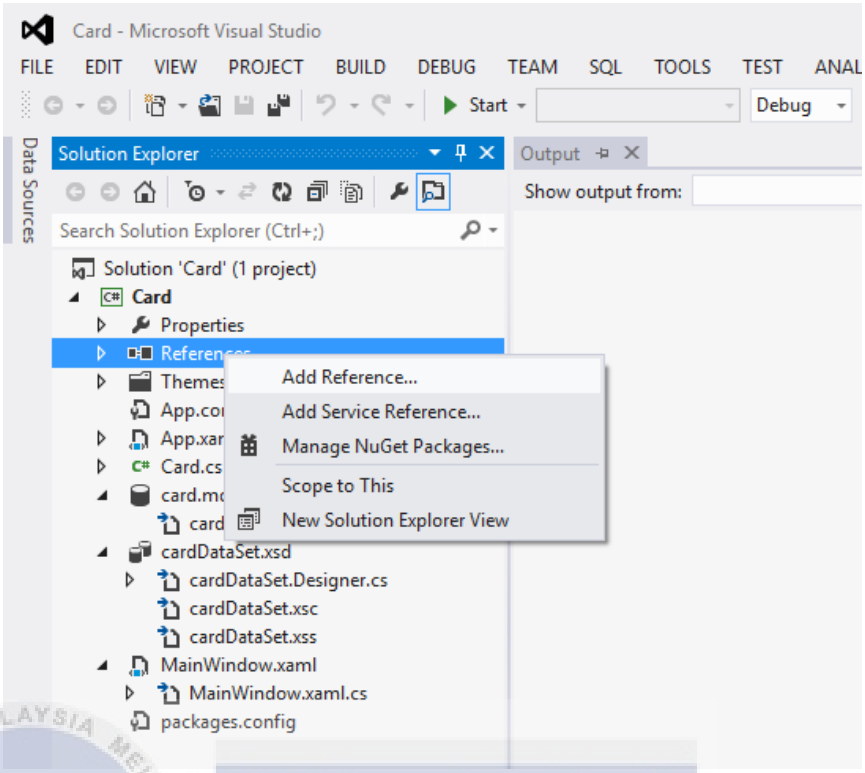


Figure 17 Adding Reference

Step 2 : To add the reference, choose 'Browse'

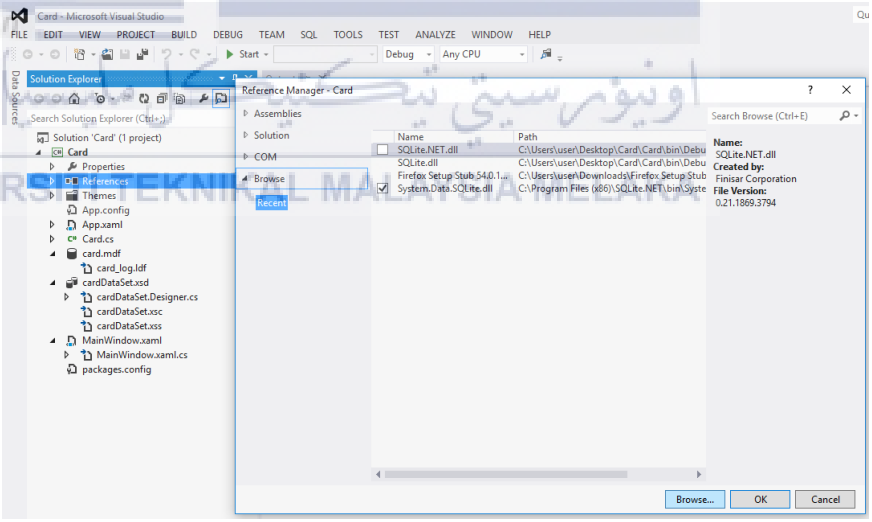


Figure 18 Adding Reference

Step 3: Go to Program and File(x86)>SQLite.NET>bin>System.Data.SQLite.dll

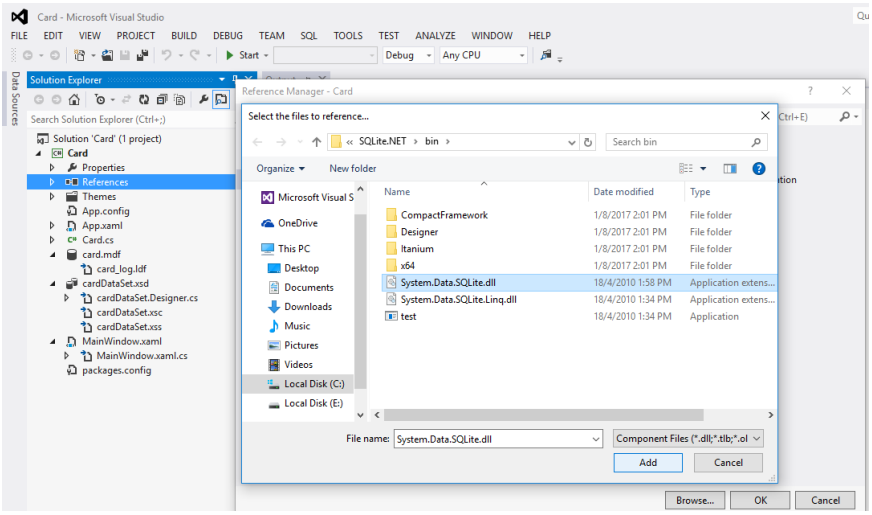


Figure 19 Adding Reference

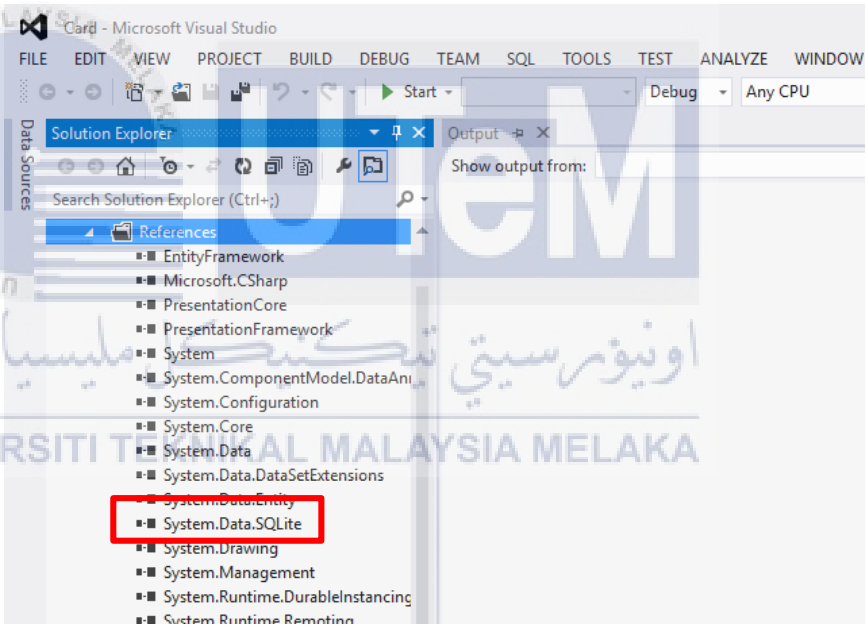


Figure 20 Shown that Visual Studio had add the SQLite as reference

Step 4: Create a database at the Visual Studio by execute below command.

```
// We use these three SQLite objects:
SQLiteConnection sqlite_conn;
SQLiteCommand sqlite_cmd;
SQLiteDataReader sqlite_datareader;

// create a new database connection:
sqlite_conn = new SQLiteConnection("Data Source=database.db;Version=3;New=True;Compress=True;");
sqlite_conn.Open();
sqlite_conn.Close();
```

Figure 21 Database Creation

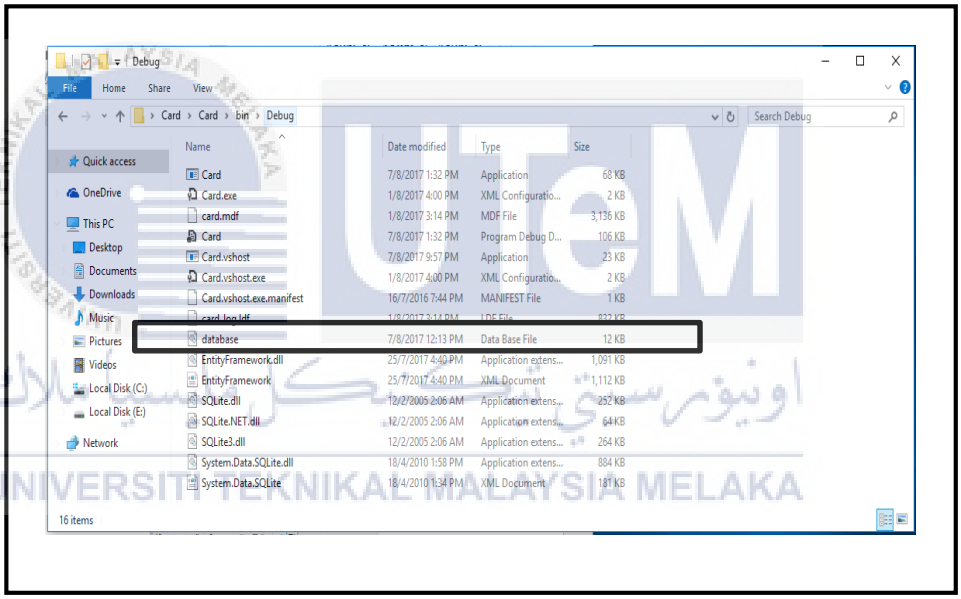


Figure 22 Database Created

Step 5: To connect database that has been created in the Visual Studio's project, first add the SQLite Database Server to the Mozila Firefox browsers add-on and search SQLite manager.

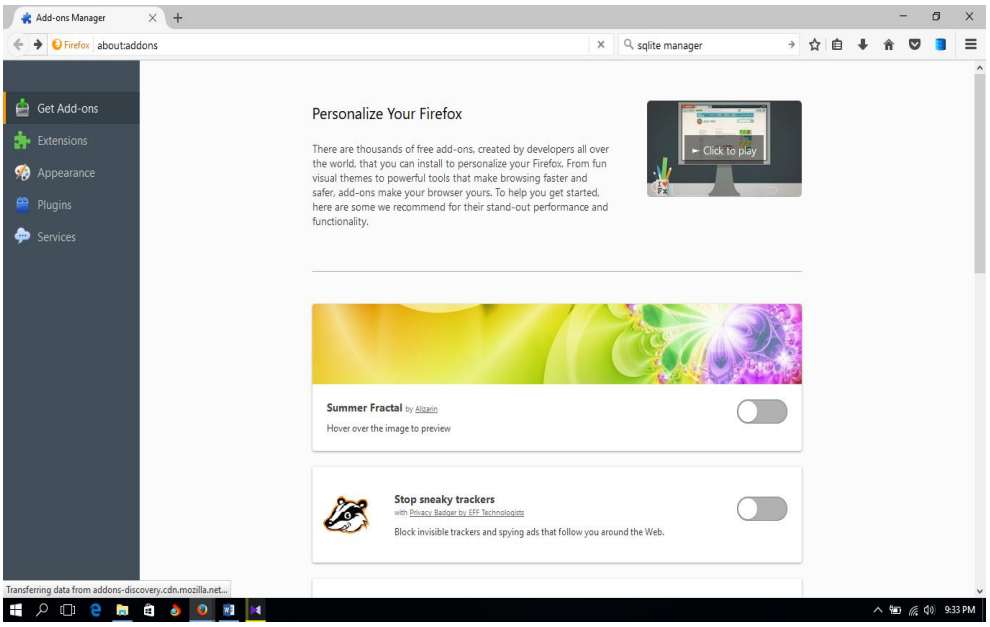


Figure 23 Adding SQLite Database Server on Mozila Firefox Browser

Step 6: Go to the link https://addons.mozilla.org/en-US/firefox/addon/sqlite-manager/ to add the SQLite add-on on Mozila Firefox Browser and install the add on.

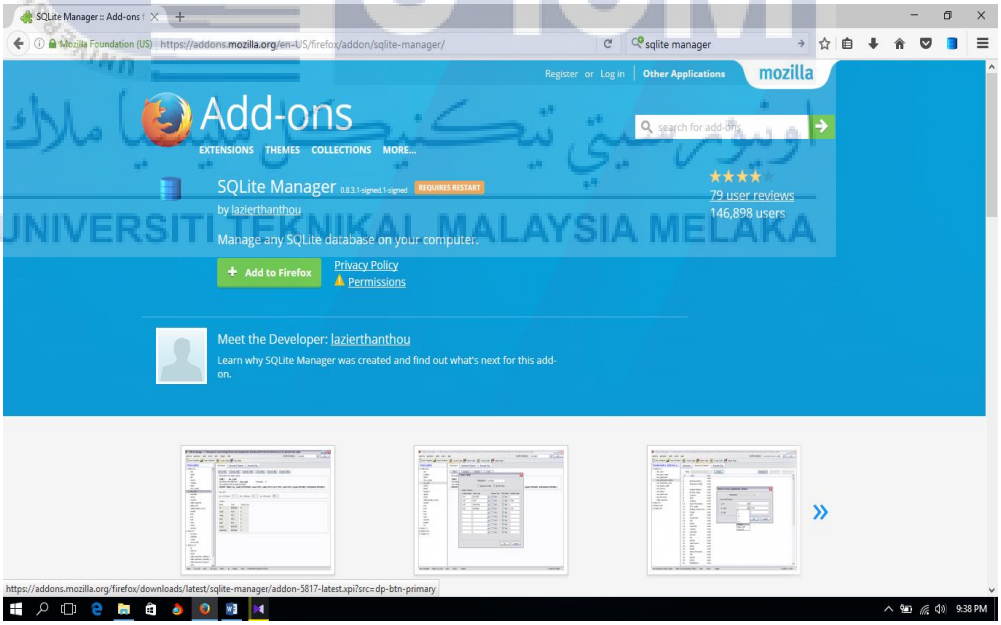


Figure 24 Adding SQLite Database Server on Mozila Firefox Browser

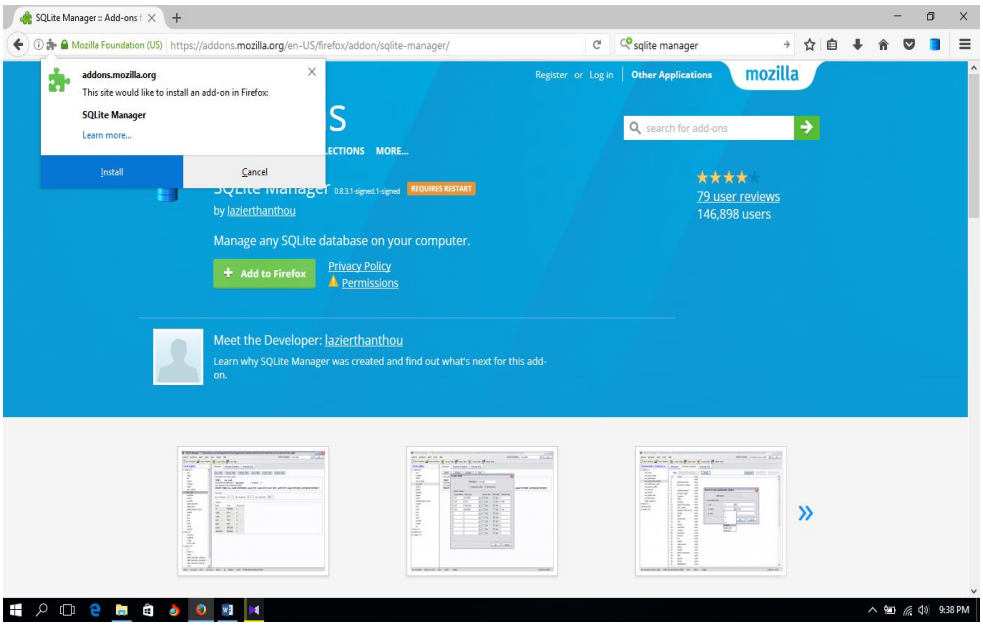


Figure 25 Adding SQLite Database Server on Mozila Firefox Browser

Step 7: Connect the database at the SQLite Server on Mozila Firefox Browser. Click on the database tab and choose connect database. Go to project that have save the database which is in 'Card' project and select the file named database.

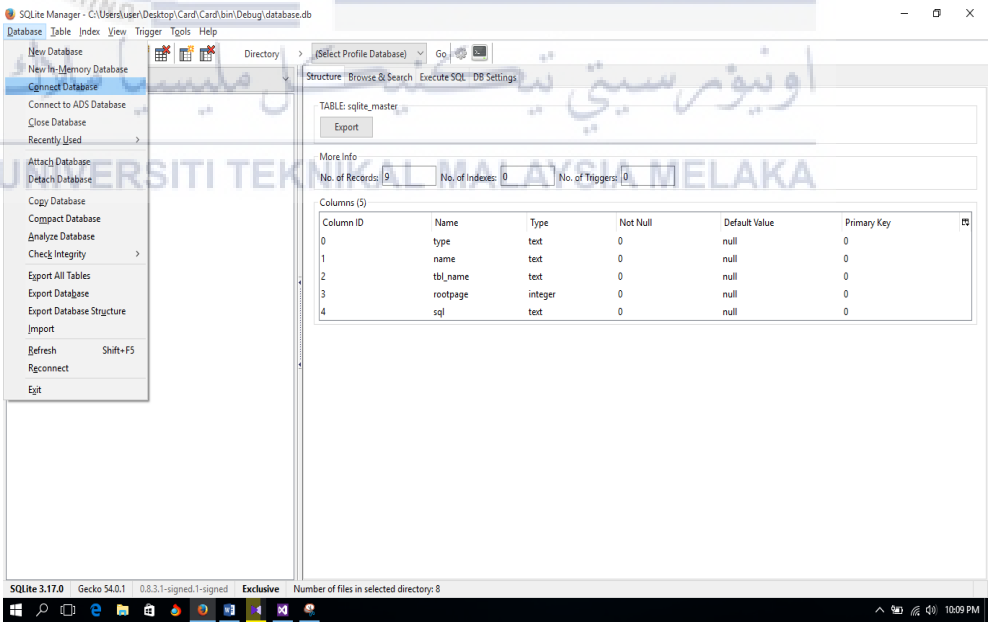


Figure 26 Connecting Database.db file to the SQLite server

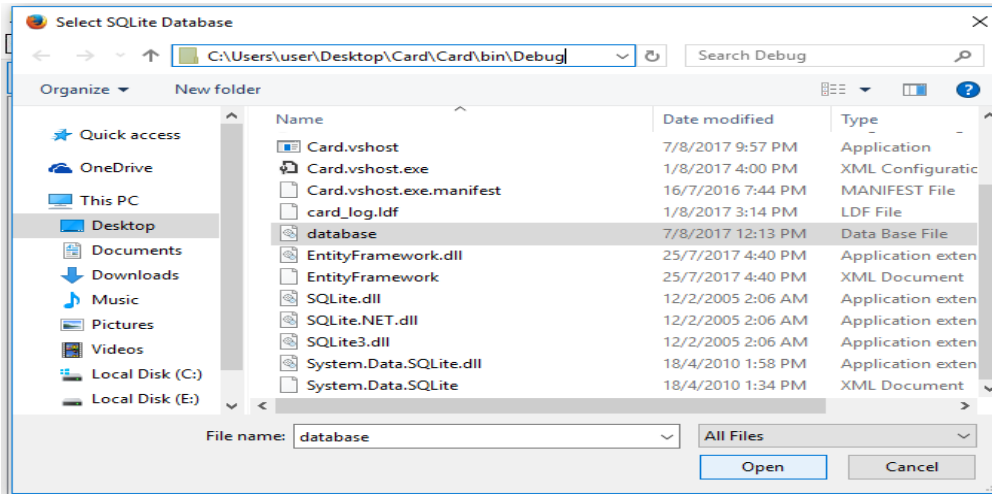


Figure 27 Connecting Database.db file to the SQLite server

Step 8: Create table in the “database.db”. Right click on the ‘Tables’ tab and choose ‘Create Table’

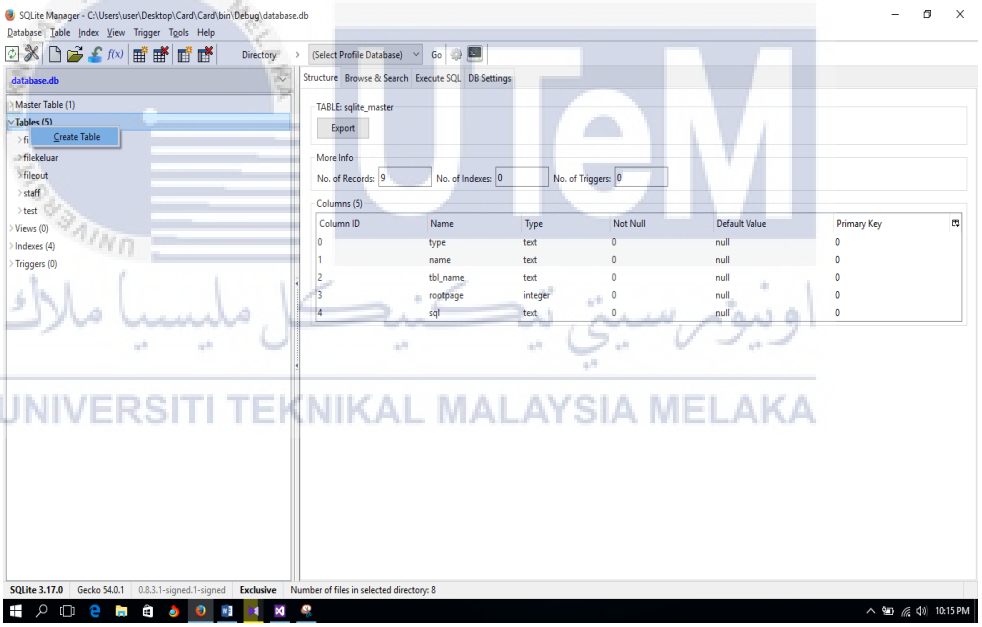


Figure 28 Creating Table Based on the Project Database.

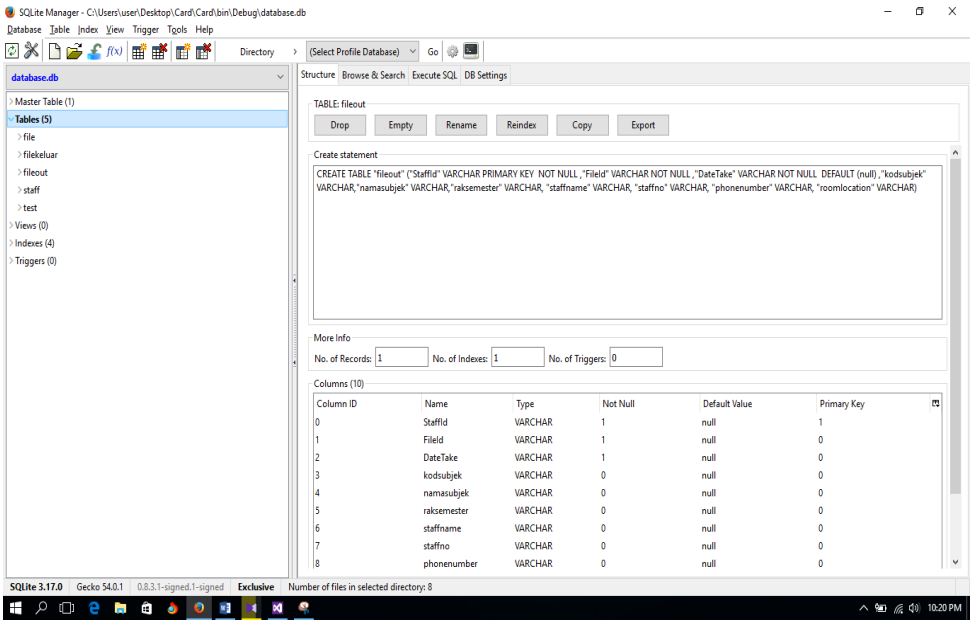


Figure 29 Creating Table Based on the Project Database.

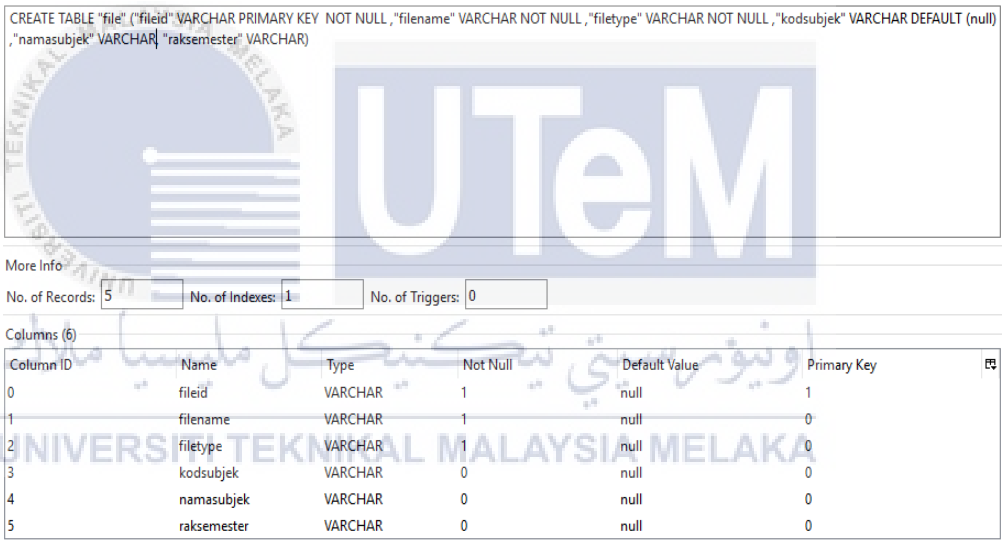


Figure 30 Database Attribute

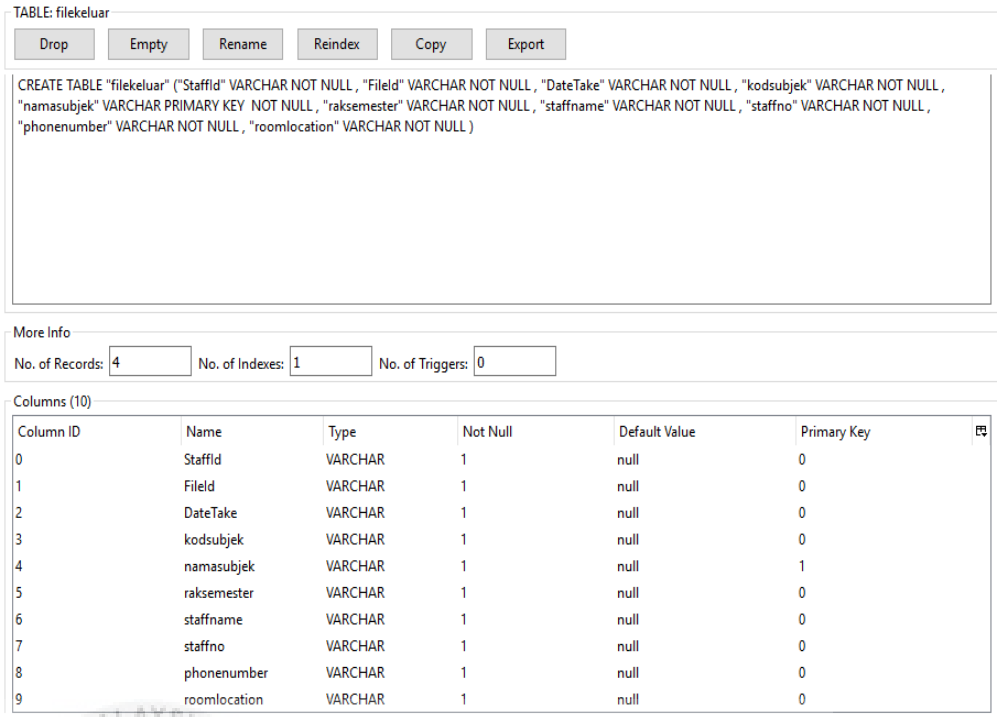


TABLE: filekeluar

Drop | Empty | Rename | Reindex | Copy | Export

CREATE TABLE "filekeluar" ("StaffId" VARCHAR NOT NULL , "FileId" VARCHAR NOT NULL , "DateTake" VARCHAR NOT NULL , "kodsubjek" VARCHAR NOT NULL , "namasubjek" VARCHAR PRIMARY KEY NOT NULL , "raksemester" VARCHAR NOT NULL , "staffname" VARCHAR NOT NULL , "staffno" VARCHAR NOT NULL , "phonenumber" VARCHAR NOT NULL , "roomlocation" VARCHAR NOT NULL)

More Info

No. of Records: 4 No. of Indexes: 1 No. of Triggers: 0

Columns (10)

Column ID	Name	Type	Not Null	Default Value	Primary Key
0	StaffId	VARCHAR	1	null	0
1	FileId	VARCHAR	1	null	0
2	DateTake	VARCHAR	1	null	0
3	kodsubjek	VARCHAR	1	null	0
4	namasubjek	VARCHAR	1	null	1
5	raksemester	VARCHAR	1	null	0
6	staffname	VARCHAR	1	null	0
7	staffno	VARCHAR	1	null	0
8	phonenumber	VARCHAR	1	null	0
9	roomlocation	VARCHAR	1	null	0

Figure 31 Database Attribute

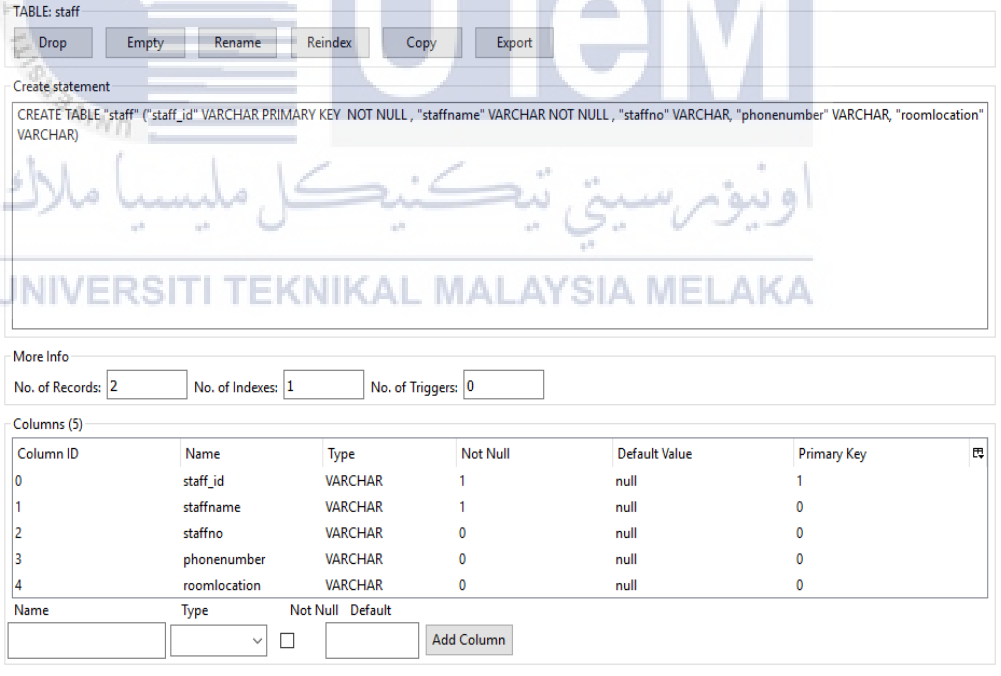


TABLE: staff

Drop | Empty | Rename | Reindex | Copy | Export

Create statement

CREATE TABLE "staff" ("staff_id" VARCHAR PRIMARY KEY NOT NULL , "staffname" VARCHAR NOT NULL , "staffno" VARCHAR, "phonenumber" VARCHAR, "roomlocation" VARCHAR)

More Info

No. of Records: 2 No. of Indexes: 1 No. of Triggers: 0

Columns (5)

Column ID	Name	Type	Not Null	Default Value	Primary Key
0	staff_id	VARCHAR	1	null	1
1	staffname	VARCHAR	1	null	0
2	staffno	VARCHAR	0	null	0
3	phonenumber	VARCHAR	0	null	0
4	roomlocation	VARCHAR	0	null	0

Name | Type | Not Null | Default | Add Column

Figure 32 Database Attribute

5.3.2 RFID Configuration (ACR122-U)

a) ACR122-U integration

Step 1: In order to make the ACR122-U NFC Reader work with the system, run the code below:

```
public partial class MainWindow : Window
{
    int retCode;
    int hCard;
    int hContext;
    int Protocol;
    public bool connActive = false;
    string readername = "ACS ACR122 0";      // change depending on reader
    public byte[] SendBuff = new byte[263];
    public byte[] RecvBuff = new byte[263];
    public int SendLen, RecvLen, nBytesRet, reqType, Aprotocol, dwProtocol, cbPciLength;
    public Card.SCARD_READERSTATE RdrState;
    public Card.SCARD_IO_REQUEST pioSendRequest;
```

```
public void SelectDevice()
{
    List<string> availableReaders = this.ListReaders();
    this.RdrState = new Card.SCARD_READERSTATE();
    readername = availableReaders[0].ToString();//selecting first device
    this.RdrState.RdrName = readername;
}
```

```
public List<string> ListReaders()
{
    int ReaderCount = 0;
    List<string> AvailableReaderList = new List<string>();

    //Make sure a context has been established before
    //retrieving the list of smartcard readers.
    retCode = Card.SCardListReaders(hContext, null, null, ref ReaderCount);
    if (retCode != Card.SCARD_S_SUCCESS)
    {
        MessageBox.Show(Card.GetScardErrMsg(retCode));
        //connActive = false;
    }

    byte[] ReadersList = new byte[ReaderCount];

    //Get the list of reader present again but this time add sReaderGroup, retData as 2rd & 3rd parameter respectively.
    retCode = Card.SCardListReaders(hContext, null, ReadersList, ref ReaderCount);
    if (retCode != Card.SCARD_S_SUCCESS)
    {
        MessageBox.Show(Card.GetScardErrMsg(retCode));
    }

    string rName = "";
    int indx = 0;
    if (ReaderCount > 0)
    {
        // Convert reader buffer to string
        while (ReadersList[indx] != 0)
        {

            while (ReadersList[indx] != 0)
            {
                rName = rName + (char)ReadersList[indx];
                indx = indx + 1;
            }

            //Add reader name to list
            AvailableReaderList.Add(rName);
            rName = "";
            indx = indx + 1;

        }
    }
    return AvailableReaderList;

}
```

```
internal void establishContext()
{
    retCode = Card.SCardEstablishContext(Card.SCARD_SCOPE_SYSTEM, 0, 0, ref hContext);
    if (retCode != Card.SCARD_S_SUCCESS)
    {
        MessageBox.Show("Check your device and please restart again", "Reader not connected", MessageBoxButton.OK, MessageBoxImage.Warning);
        connActive = false;
        return;
    }
}
```

Figure 33 RFID (ACR122U) Integration

5.4 Conclusion

In conclusion, the implementation phase is to show how to make this project work. Environment setup explained about the process involved in this project. In the next chapter, the testing phase is conducted.

Chapter VI

TESTING

6.1 Introduction

This chapter describe about the testing of this project. The process of testing is to find out the effective of performance how file tracking system using NFC reader as the main platform to authorize the main function of this system which is search who had take the file and do the file exist on the shelf. This testing had been done several times in order to make sure the reader is integrated with the Visual Studio and the project build. In this project, when the user tag the card it display the staff details and when tag the wristband, then, it displays the detail of the ISO file. Section 6.2 discuss on the testing plan.

6.2 Test Plan

This part explained the basis for the testing of the system. It also covers testing activities and scope of the system.

6.2.1 Test Organization

In this testing phase, developer test the system. Developer then know how the system is working from the beginning phase until the end.

6.2.2 Test Environment

In the design phase, the interface for user details is configured. Therefore, user is able to view the interface via computer screen that is provided. The purpose of the test environment is to provide a structure for the testing activities. In this task, the test environment requirements are established and reviewed before implementation.

6.2.3 Test Schedule

This section describe how the testing are carries out by developer in a period of time. During the testing process, the system error and problems are returned back to implementation phase. Then, error and problems are declared and solved. If the error and problem cannot be solved, the issues are returned to implementation phase again. This is continuous process cycle until the system is successfully built.

6.3 Test design

Test design is a part of system testing where the developer design the testing where the developer design the testing cases for the system. Each test specifies the step-by-step procedures in order to validate system.

6.3.1 Test Description

After defining the test plan and test strategy, the test cases are identified with the expected result for each module. This test covered separate part of the system such as ACR122U NFC reader, database, user interface and the overall system. All test descriptions are shown in the following tables:

Table 14: ACR122U NFC Reader Testing

Test	ACR122U Testing
Test purpose	To test the integration between Visual Studio 2012 and ACR122U Testing
Test environment	In order to run this pre situation test, ACR122U must be connected to the laptop at the USB port. Installation procedure as stated in section 5.2.2 in implementation.
Test setup	Connect the reader to the USB port on the laptop Wait until the LED light on the reader on put the RFID tag on the reader and see the LED light turn from red to green and produce a 'titt' sound
Expected result	Output of the result can be referred at the sub-section 6.4.1

Table 15: Database Testing

Test	Database test functionality
Test purpose	This test is carried to test the integration of system with database
Test environment	In order to run this pre situation test, database must be installed. The installation phase is in sub-section 5.3.1
Test setup	Full procedure of database setup is in the sub-section 5.3.1
Expected result	Output of the result can be referred at the sub-section 6.4.2

Table 16: Overall System Test

Test	ISO File Tracking Using NFC Device In Secured Environment Test
Test purpose	This test is carried to test the integration of overall system
Test environment	In order to run this pre situation test, full coding and configuration must be finished.
Test setup	Full procedure of this testing is in the sub-section 6.4.4
Expected result	Output of the result can be referred at the sub-section 6.4.4

6.4 Result and Analysis

6.4.1 Test the ACR122U NFC reader

The ACR122U NFC reader test need to be carried in order to test its functionality. To begin the test, ACR122U NFC reader must be plug in onto the USB port at the laptop or computer.

Figure 34 Plugged In NFC

Based on the figure 33, the test is a success as the NFC reader's LED light is on. And when the tag been put on the reader the LED light switch from red to green light.

6.4.2 Test the Database

In order to test the database integration with the system, first thing to do is that create two database files which is "file" and "filekeluar" as shown in the figure 34 below.

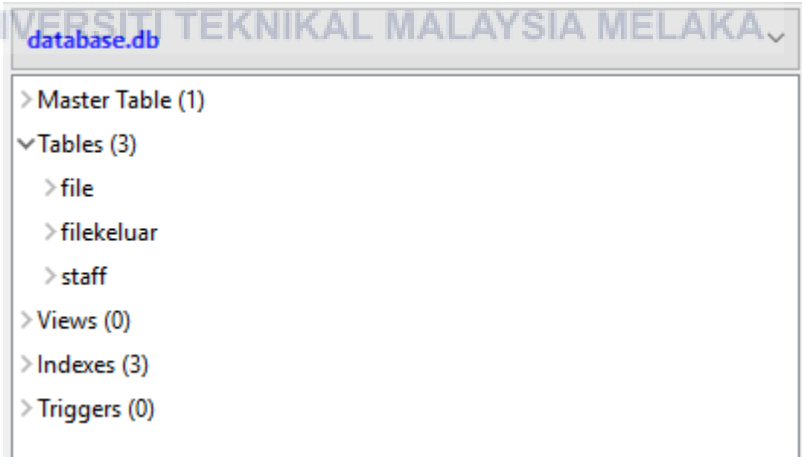


Figure 35 System Database at SQLite Server Database

To connect the database with ISO File Tracking System, it need to be conjured with the following command shown in the figure 35.

```
string dbConnectionString = @"Data Source = database.db;Version = 3;New=True;Compress=True;";
```

Figure 36 Command on How to Connect Database with System

6.4.4 Test the Overall System

This test is carried out to test the full working system. Execute the system as shown in figure 36.

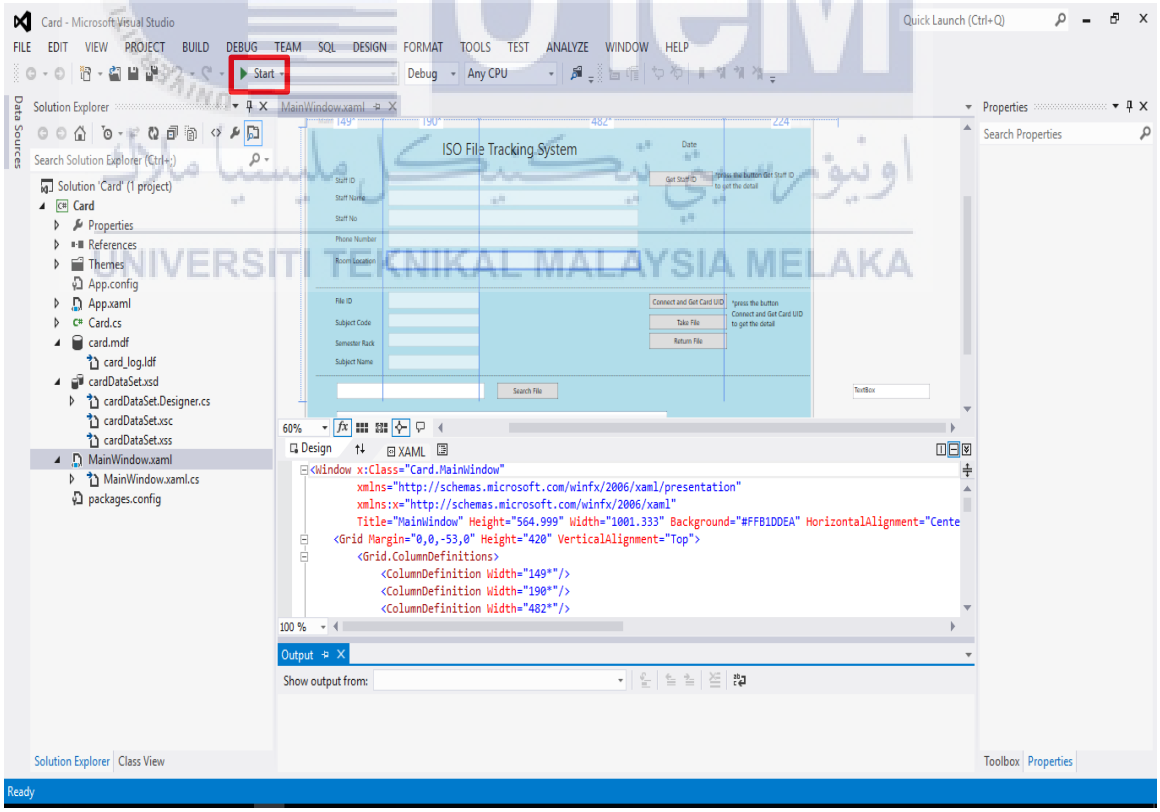


Figure 37 Running the system

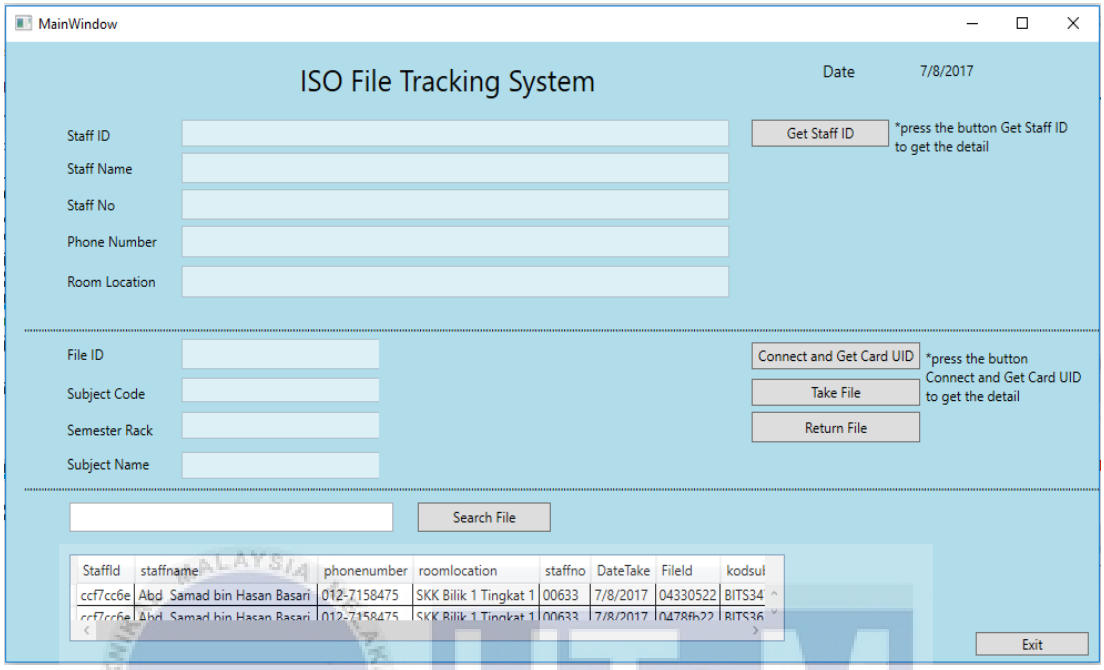


Figure 38 Main Page of system

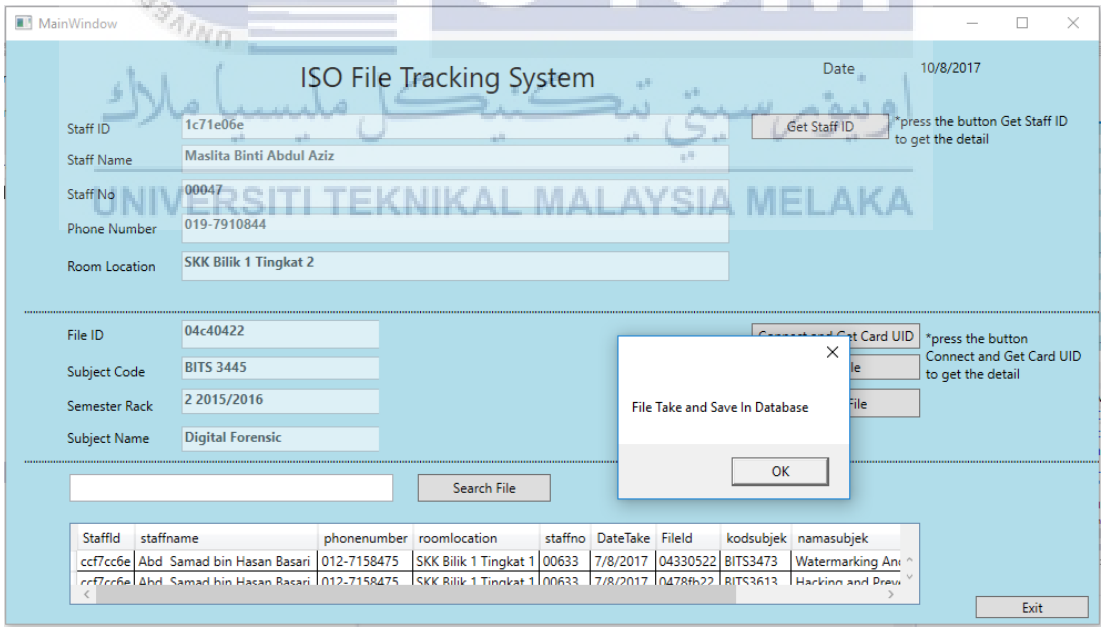


Figure 39 File Take

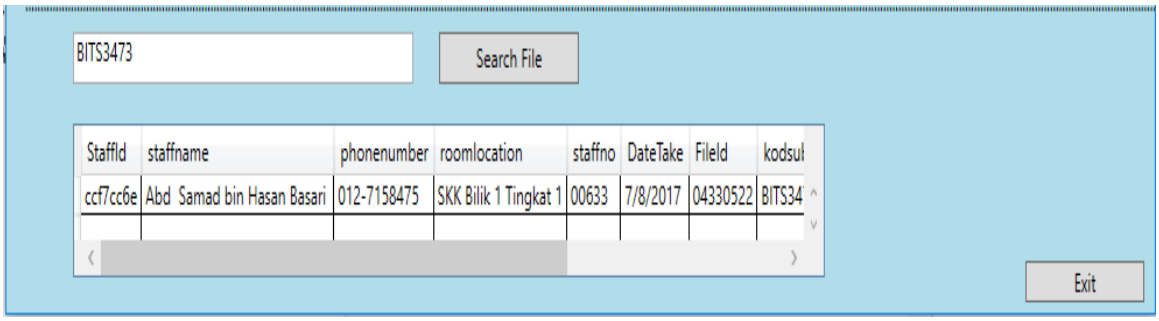


Figure 40 Searching File Current Detail

Based on the figure shown above, it is the system user interface, when the user want to take the file out from file room, the search interface to search the file and the output shown if the file is in the room or not.

6.5 Conclusion

In conclusion, chapter VI is about the testing and result phase. This phase carried to test the ACR122U NFC Reader, Database and The Overall Full System. In next chapter discussing about the project summarization, limitation and future work.

Chapter VII

CONCLUSION

7.1 Introduction

Testing phase had been done in the previous chapter. For this chapter, it focuses on the project conclusion. In the project conclusion, it also explain about project contribution, project limitation and future work. Project contribution is the new finding that we had found that is implemented towards the project. Project limitation is the restriction that were found during the project implementation or making. While future works is something that can be done to this this project so that it can be enhanced to produce better work.

7.2 Project Summarization

ISO File Tracking System is a system that allow the user to track the file location using the database that has been stored using NFC reader and tag. This system is developed to assist UTeM lecturers and staff to search the file easily and store the details of the file took. For the objective of project, first objective is to

identify the location of the ISO file base on the information in the database, to read the information from the tag using NFC based reader. The objective had been done which the reader had succeed in reading the unique ID of the tag and to design an enhanced security in matching method for tracking the current location of the ISO file for more secured and convenient working environment. In order to achieve all the objectives, the ISO File Tracking System is developed successfully and meets all objectives. However, this ISO File Tracking System has its own weakness and strength.

7.2.1 Strength

The strength of ISO File Tracking System as stated below:

a) User friendly

ISO File Tracking System is user friendly as it has the user (GUI) interface that it is easy to use. User can easily understand to use this system as it has been divided section by section.

b) Security

ISO File Tracking System has enable all the text box and it then fill the textbox by itself the detail of staff and file when user tag the card or the wristband to reader. This can make the system is not vulnerable and whoever take the file cannot lie about a single detail about to be save or deleted.

c) Environmental friendly

ISO File Tracking System is an environmental friendly as it has replace the use of paper to store the detail about the file and staff.

7.2.2 Weakness

The strength of ISO File Tracking System as stated below:

a) Not auto read the ID from the tag

   ISO File Tracking System did not auto read the id when the user prompt to get the tag ID. User need to click the button first to get the id and the detail.

b) Did not display the available file

   ISO File Tracking System did not display the available file when user want to search the availability of file on the shelves. This system just display who had took the file.

c) Did not produce report for the file detail

   This system build with no print report button.

7.3 Project Contribution

This project was developed to propose suitable method for searching and matching the ISO files. This has been done by using the RFID tagging method by using double verification layer method.

This project is proposed to be able to protect the file in the ISO file room from missing and misallocation. Thus this project is very suitable to be applied and used in various institution especially in UTeM.

This project is proposed to read the data from the RFID tag which it will

display the detail of staff id and file name when the staff tag their staff matrix card at the reader and the file tag at the reader.

7.4 Project Limitation

a) Require user to click button connect ID to get the tag UID

   This project could not display the UID and detail of the card tag or wristband tag if the user did not click the connect button.

b) Require Visual Studio to run the system

   This project requires Visual Studio 2012 or the newest one on order to run this system.

7.5 Future Works

In order to the RFID tagging method, it can be hybrid with Raspberry Pi technology which this technology is still in the wide use. This project can be a better one if use wireless technology. It is because when use the wireless we can use the cloud database and use the available wireless to read the data anywhere and anytime. Use an active reader to track whether the file is exactly put on the shelves and to track if the file were taken with or without authorization. This project can also upgraded for a better performance if there is print button to print the current detail of files and also display the availability of file when the user want to search it which not only display the file that were took out from the files room.

7.6 Conclusion

In conclusion, the project has met with all objectives and scopes defined in the proposal and in the Chapter 1. Throughout the developing this project need more adaption in order to have better performance and can be implemented and widely used in NFC system.

REFERENCE

Atlas RFID Store. (2012). The basics of an RFID system, 1–16. Retrieved from http://rfid.atlasrfidstore.com/hs-fs/hub/300870/file-252314647-pdf/Content/basics-of-an-rfid-system-atlasrfidstore.pdf

Curran, K., Millar, A., & Garvey, C. M. (2012). Near Field Communication, *2*(3), 8708.

Datta, D. B. (2016). Radio Frequency Identification Technology : An Overview of its Components , Principles and Applications, *5*(2), 565–574.

Peter Bodnar, & Nyul, L. G. (2012). Improving Barcode Detection with Combination of Simple Detectors. *Improving Barcode Detection with Combination of Simple Detectors*, 0–6. http://doi.org/10.1109/SITIS.2012.52

Subramaniam, H., Hassan, M., & Widyarto, S. (2013). Bar Code Scanner Based Student Attendance System (SAS). *Journal of Technology of Information and Communication (TICOM), 1*(1), 173–177. Retrieved from http://portalgaruda.ilkom.unsri.ac.id/index.php?ref=browse&mod=viewjournal&journal=2155&issue= Vol 1, No 3 (2013): Vol. 1 No. 3 (2013)

R.D.Noble. (2014). Books @ Books.Google.Com.My. *Membrane Seperation Technology*. Retrieved from http://books.google.com.my/books?id=-AfNV215sPAC&lpg=PA1&pg=PA20#v=onepage&q&f=false

Nozaki, M. K., & Tipton, H. F. (2011). Information Security Management Handbook, Sixth Edition, *6*, 560. Retrieved from http://books.google.no/books?id=0MGq4DLGSmgC

Labs, C., & Documents, T. (n.d.). RFID in Document Tracking Locating critical files and documents is one of the, 1–5.

Method, A. I. (2016). Advanced Integration Method (AIM), (June).

Management, I. (2004). Passive RFID Solutions for Asset Tracking and Inventory Management, 1–6.

America, S., & Africa, S. (n.d.). Understanding the Benefits of Active RFID for Asset Tracking How companies can address their auto-identification challenges with active RFID technology Understanding the Benefits of Active RFID for Asset Tracking How companies can address their auto-ident, *44*(0).

APPENDICES

(User Manual)

1. INTRODUCTION

1.1 PROJECT IDENTIFICATION

System Identification Number :

System Title : ISO File Tracking System using NFC Device in Secured Environment

System Abbreviation : IFTS

1.2 AUTHORIZED USE PERMISSION

Usage of this software is limited to its owner via the terms of its development. ISO File Tracking System using NFC Device in Secured Environment (IFTS) is wholly owned by Universiti Teknikal Malaysia Melaka (UTeM), and may not be used or referenced without their express consent.

1.3 POINTS OF CONTACT

For additional information, anisajmal95@gmail.com 01112909871

1.4 PROJECT OVERVIEW

Monitoring and maintaining huge hardcopy files is a tedious tasks in an organization that most files management is done manually. However, the manual process creates data loss, data inconsistency and files misallocation that brings ineffective and insufficient flows to the organization.

Thus, a new autonomous files system is highly needed for managing hardcopy files system. In fact, current autonomous files systems available are barcode, QR code and RFID system for files system. Nevertheless, barcode and QR code information still can be copied by third party. In addition, RFID's data privacy is exposed when other user have the same NFC device, he or she can also read the data and tend to scan random tag number. In order to overcome this problem, this study is to improve the security of data transmission. Therefore, tracking using NFC based Mobile Device is introduced in Secured Environment created on web application system for staff and admin in an organization, called as "ISO Files Tracking System". The functions provided by this files system are fully customized based on the problem faced by the staff when using the manual process flow.

The IIIS system is a windows application system. The software that used to develop this system is Visual Studio 2012 and SQLite Database.

1.4.1 Objectives

The objectives of this system are to identify the location of the ISO file base on the information in the database. To read the information from the tag using NFC based device. To design an enhanced security in matching method for tracking the current location of the ISO file for more secured and convenient working environment

1.4.2 Modules

This system is made up with four main modules which are: Staff Identification, File Identification, Take File or Return File and Search File. The targets users for this system are for:

- UTeM staff

a) Staff Identification

- User need to identify themselves using their identification card and tag their id at the reader.

b) File Identification

- User need to tag the file at the reader in order to identify the file and to get the detail about the file.

c) Take File or Return File

- User need to click the button “Take File” to take the file outside the ISO file room.
- User need to click the button “Return File” to return the file to the ISO file room.

d) Search File

- To search the file detail user need to fill the desire file detail like subject code and click on the search button.

1.5 DOCUMENT OVERVIEW

The explanation is about the document overview and it is divided into 3 sections:

Section 1

Introduction

This section is describes about the details of information of the system, overview of the module in the system, and also the overview of the document.

Section 2

Detailed Design

This section gives the detail explanations about the design of the system.

Section 3

Getting Started

This section provides the manual to the user on how to use IIIS system.

2. DETAIL DESIGN

Below is the figure that shows the interactions between each module in IFTS.

2.1 SYSTEM CONFIGURATION

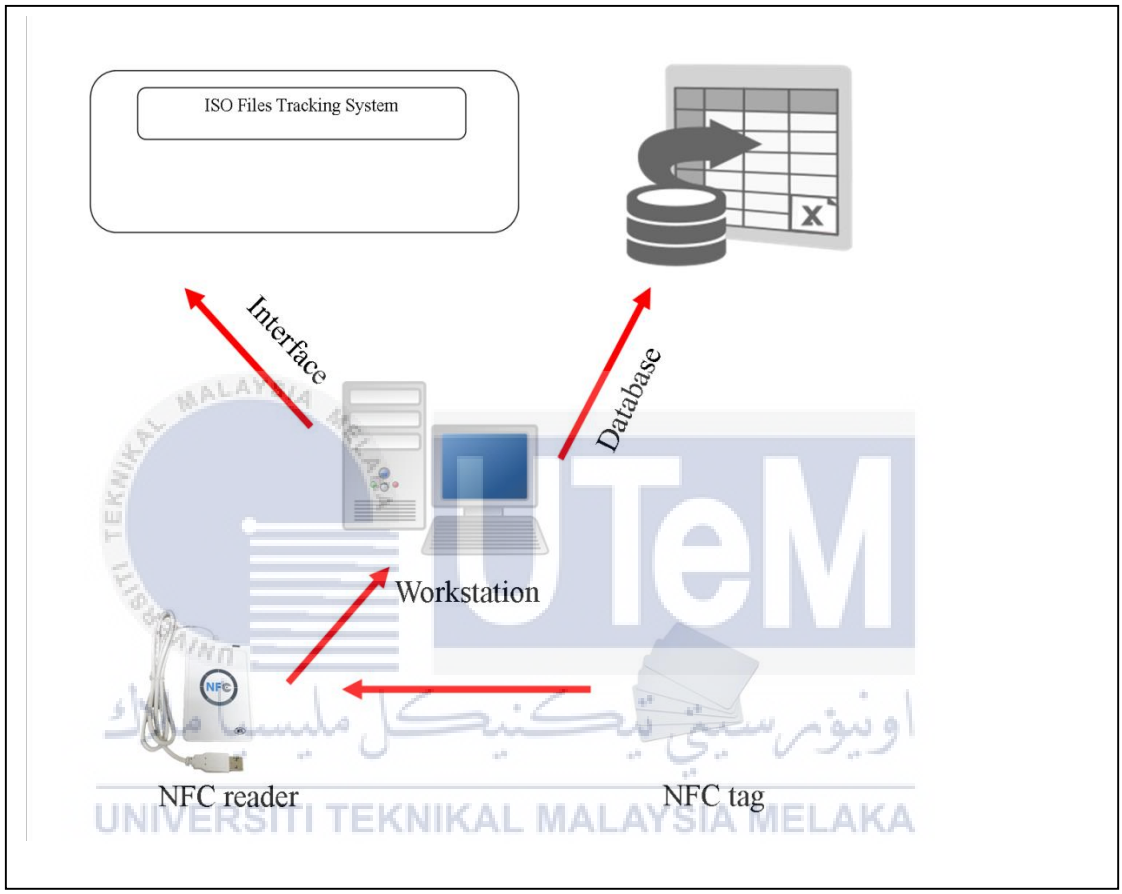


Figure 41 IIIS Framework System

Workstation then store the database and the output interface of the system. The user card have to tag to NFC reader to take the hardcopy file, it is because all insider hardcopy files details is stored in database and the NFC reader then detect the ID of the hardcopy files card.

2.2 FUNCTION FLOWS

Below is a diagram depicts the normal flow of the ISO File Tracking System using NFC Device in Secured Environment (IFTS) process followed immediately by the running system, ready for unique features detection.

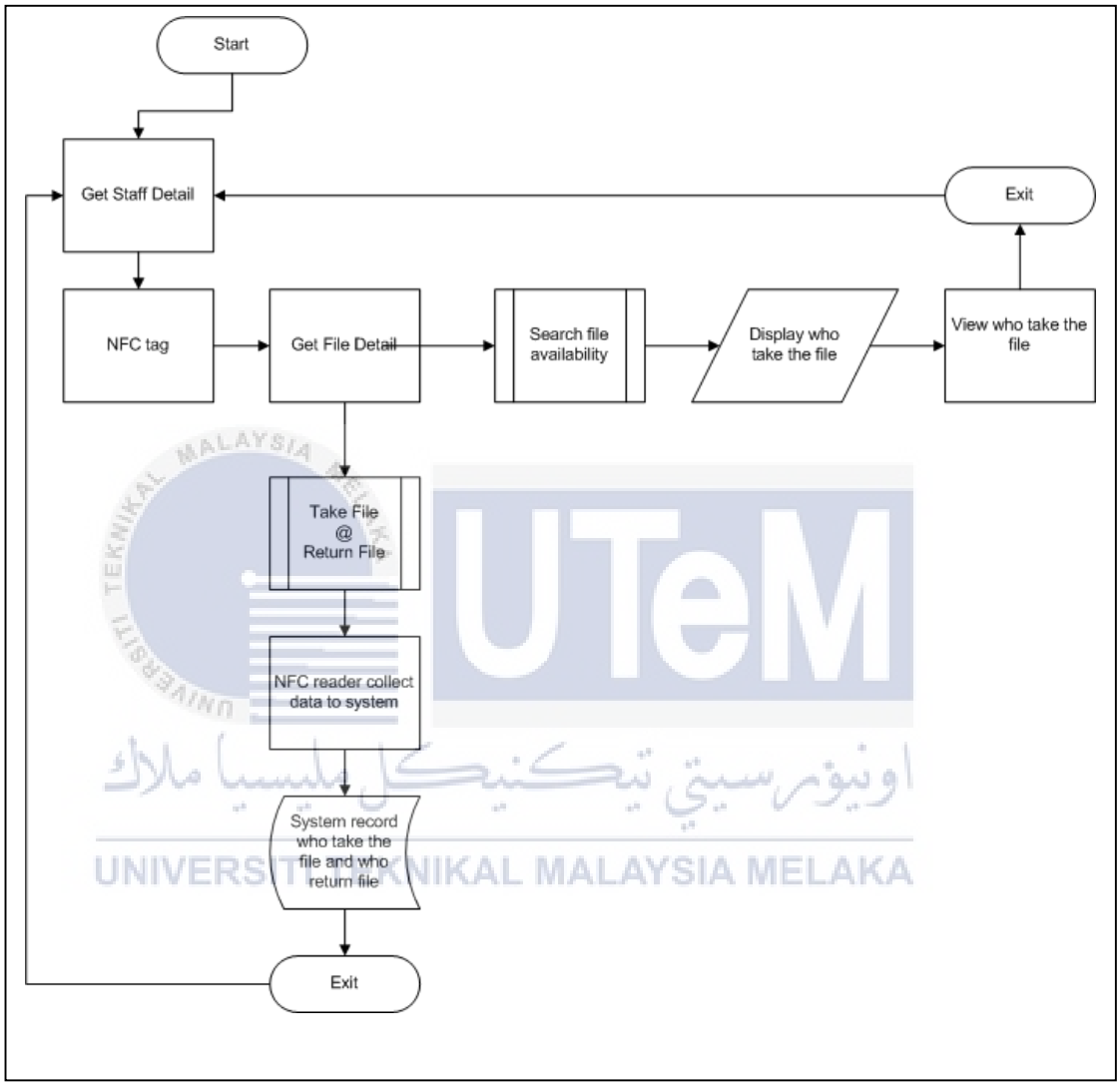


Figure 42 Flowchart of IFTS

2.3 IFTS Model

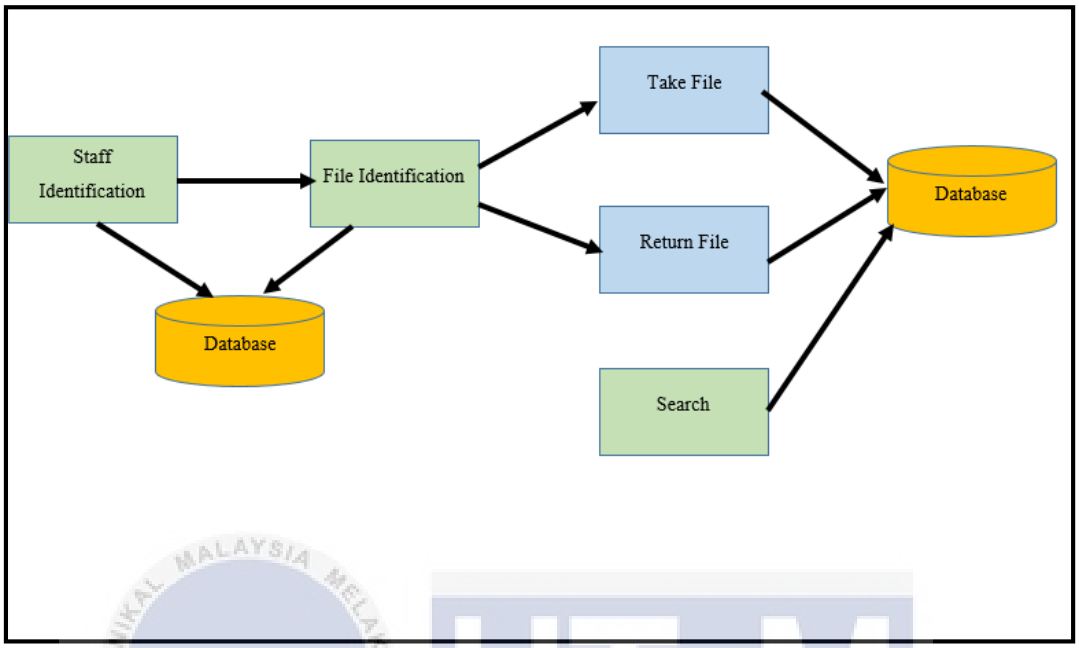


Figure 43 IFTS Model

Get Staff Detail

Get staff detail is the first part of this system where staff need to tag their ID at the reader and the system then display the detail like staff ID, staff name, staff number, staff phone number and staff room location.

Get File Detail

Get file detail is the part where staff need to tag the file at the reader and the system then display the detail like File ID, subject name, subject code and semester rack .

Take File

Function where the system record who had take the file and which file were taken.

Return File

Function where the file placed back to the database for its detail.

Search File

Function where staff can look for the detail of file either it on the shelve or not.

3. GETTING STARTED

Extracting, Installing, and Running Integrated Iris Identification Solutions (IIIS)

3.1 EXTRACTING FROM THE .ZIP ARCHIVE

In addition to user documentation, the ISO File Tracking System using NFC Device in Secured Environment (IFTS) .rar file contains installers for the Windows service. It must be executed before ISO File Tracking System using NFC Device in Secured Environment (IFTS) can be optimized and run.

3.1.1 INSTALL IFTS INSTALLER

Installs ISO File Tracking System using NFC Device in Secured Environment (IFTS)

3.1.1.1 UNZIP THE IFTS.RAR'FILE TO A CONVENIENT LOCATION

Below is Figure 3.1 shows 'IFTS.rar' file in the computer.

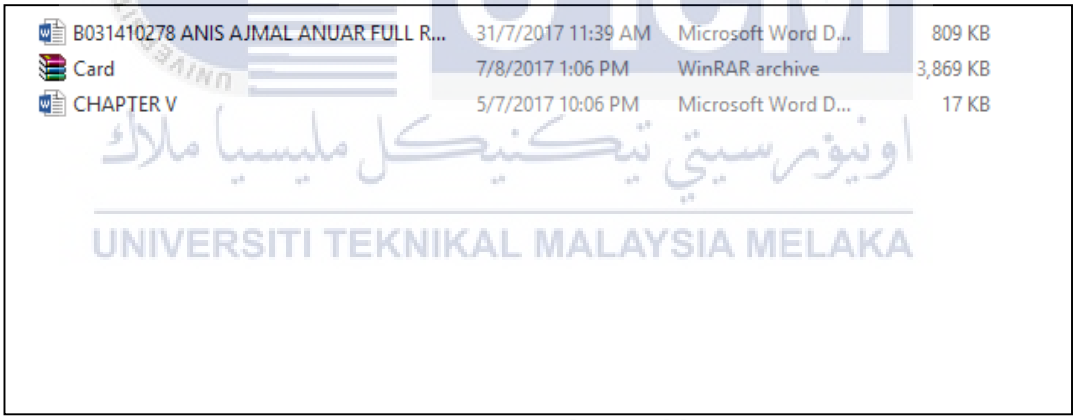


Figure 44 card.rar Folder

Open the 'IFTS.rar' files in the computer where you the file is save.

Right click on the icon 'IFTS.rar' file to unzip the file.

3.1.1.2 Run card.exe

Figure 3.2 below shows card file in the folder card.rar.

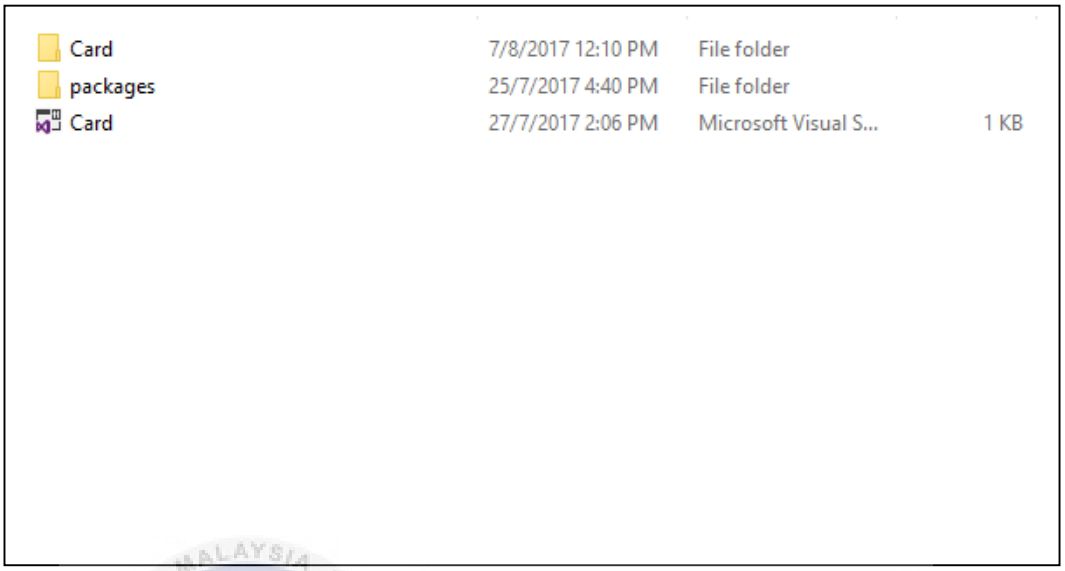


Figure 45 Select card

- Double click the card folder.
- Then, click the ‘card’ to run the system into the computer.

*Note that in order to run this application, you need to have Visual Studio 2012 and above to make this system applicable.

3.2 STARTING THE APPLICATION

3.2 1 VISUAL STUDIO STARTUP PAGE

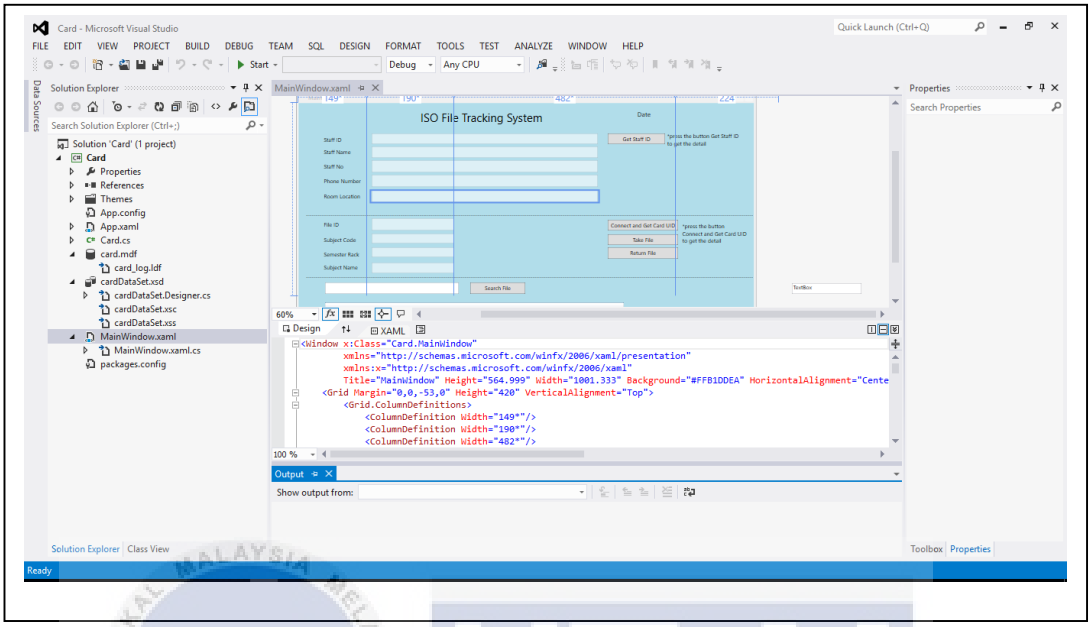


Figure 46 Visual Studio Startup

- To run the system click on the start button as highlight in the Figure 3.

3.2.1 IFTS MAIN PAGE

Below is Figure 3.3 that shows the main page of IFTS.

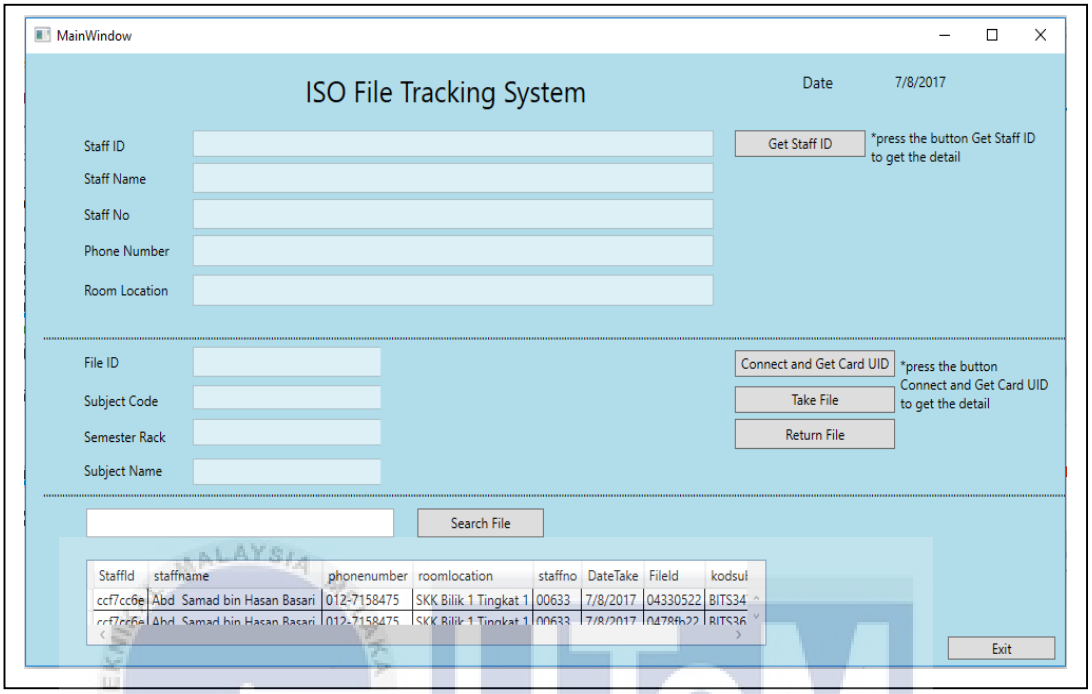


Figure 47 IIIS main page

- The main page appear after the start button is clicked.
- There are three main section in the main page which are ‘staff identification’ section, ‘File Identification’ section, ‘Search File’ section and ‘Exit’ button.

3.2.2 STAFF IDENTIFICATION SECTION

Figure 3.4 shows the main page of staff identification process.

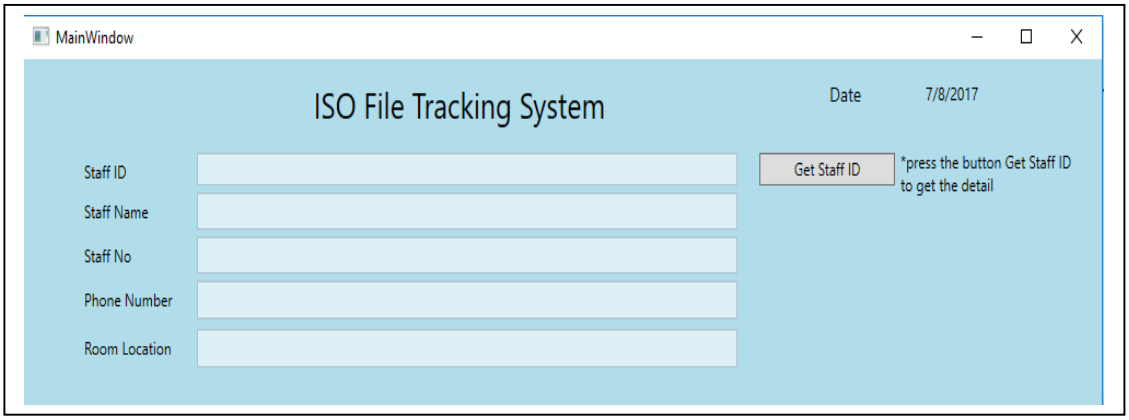


Figure 48 Enrolment page

3.2.2.1 STAFF LOAD DETAIL

The first step in enrolment process is to load the iris image. The example of iris image is shown in the Figure 3.5.

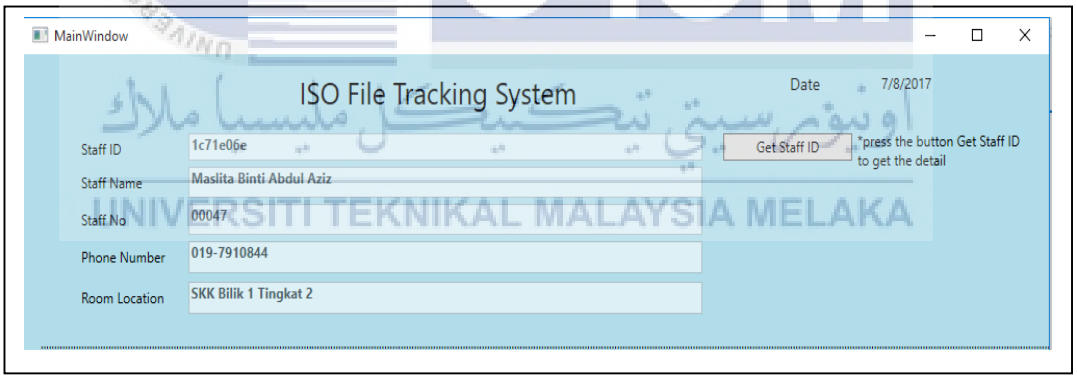


Figure 49 Load staff detail.

- Click on the 'Get Staff Id' button to load the detail of staff from the identification card.
- Then the detail appear on the form.

3.2.3 FILE IDENTIFICATION SECTION

Figure 3.8 shows the main page of identification.

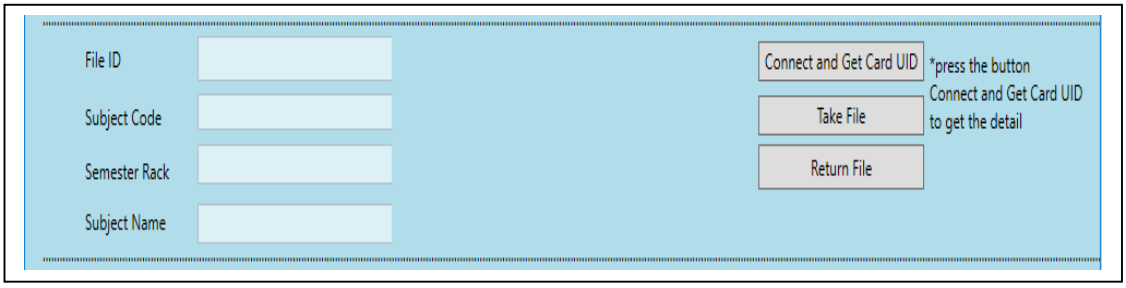


Figure 50 Identification main page.

3.2.3.1 FILE LOAD DETAIL

The first step in file identification is to load the file detail. The example of file detail is shown in the Figure 3.9.

Figure 51 File Load Detail Section

- Click on the 'Connect and Get Card ID' button load the file detail in the file database.
- Then file detail appear on the form.

3.2.4 FILE SEARCH SECTION

Figure 3.8 shows the main page of file search.

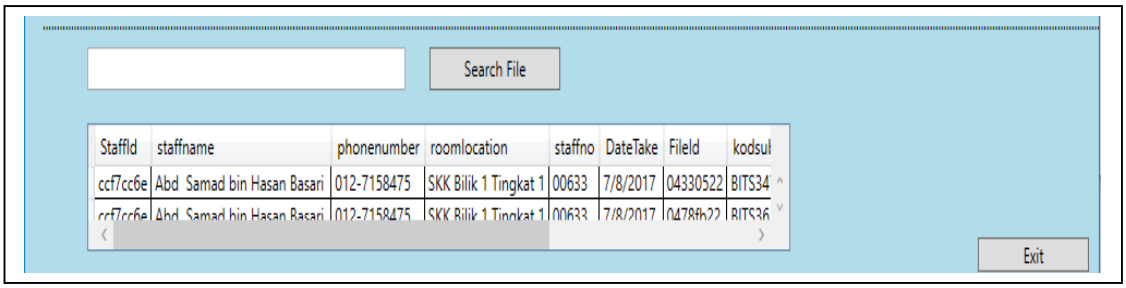


Figure 50 Identification main page.

3.2.3.1 FILE SEARCHED

The first step in searching the file is to load the file detail. The example of file detail is shown in the Figure 3.9.

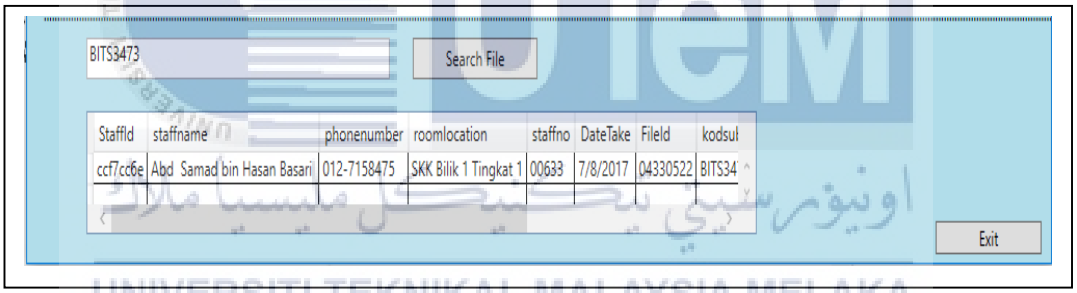


Figure 53 Load iris image.

- Write the file ‘subject code’ to search the file.
- Click on the ‘Search File’ button load the file detail in the file database.
- Then file detail appear on the form.