# WI-FI HOTSPOT MANAGER



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# WI-FI HOTSPOT MANAGER

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This report is submitted in partial fulfilment of the requirements for the Bachelor of Computer Science (Computer Networking)

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### ABSTRACT

The purpose of this project is to develop a Wi-Fi hotspot system that can manage the connected clients. This system enable user to convert their Windows machine into a wireless access point and share their resource such as internet connection and file sharing. The reason to develop this system is to improve and add extra features to the current Wi-Fi hotspot software that available in the market. Moreover, this system also help user to share their internet anytime and anywhere they go without spending any money to buy special devices just to achieve the same goal that can be done using laptop which most of us to have today. There are two internet sources that can be shared which are wired (Ethernet) and wireless (Wi-Fi). After a client connected to the hotspot, Hotspot manager (administrator) can view the details about connected client such as IP address, MAC address and hostname. Through this system, user can configure hotspot's SSID and the password which is using WPA2 encryption. Besides, it provides a user-friendly interface and effective functionality so that, user does not face any difficulty interacting with the system.

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# LIST OF ABBREVIATIONS

Wi-Fi	-	Wireless Fidelity
MAC	-	Media access control
IP	-	Internet protocol
SSID	-	Service set identifier
GUI	-	Graphical user interface
OS	-	Operating system
IT	-	Information technology
SDLC	-	System development life cycle
LAN	-	Local area network
SQL	ARLAN	Structured Query Language
WPA2	-	Wi-Fi Protected Access 2
PSK	- =	Pre-Shared Key
DFD	-	Data flow diagram
CMD	iwn -	Command prompt (Microsoft Windows)
PHP	- (	Hypertext Preprocessor
ARP		Address resolution protocol
API UNIV	ERS	Application program interface
HTTP	-	Hypertext Transfer Protocol
HTML	-	Hypertext Markup Language
WNIC	-	Wireless network interface controller
MB	-	Megabyte
GB	-	Gigabyte
ТСР	-	Transmission Control Protocol
UDP	-	User Datagram Protocol
ICMP	-	Internet Control Message Protocol
DHCP	-	Dynamic Host Configuration Protocol
ERD	-	Entity Relationship Diagram

# **CHAPTER I**

#### INTRODUCTION

# 1.1 Introduction

Wireless Fidelity (Wi-Fi) is a wireless networking technology that uses radio waves to provide high-speed, wireless internet and network connections. Wi-Fi is basically just radio waves broadcast from a Wi-Fi router, a device detecting and deciphering the waves, and then sending back data to the router. A Wi-Fi network may be public (called a hotspot), for private use by an organization or for home use. Nowadays, internet become one of the necessary aspect in our life to keep us connected with people and keep update with current world situation either in our job or social matters. For this project, a program called "Wifi Hotspot Manager" will be developed to let users share their current internet connection into wireless connectivity to others devices through Wifi Hotspot. The program will let user to configure their hotspot and show current users that connected into it. This program will let any user with Microsoft Windows operating system to share their internet connection any time they want, so they can connect their mobile devices into hotspot and access the internet. It's really flexible and easily be configured to create a Wifi Hotspot with internet access, instead of users need to buy a hub or router just to have Wifi connectivity and need complex configuration for it.

### **1.2 Problem Statement**

The widespread reliance on networking in business and the rapid growth of the Internet and online services are strong testimonies to the benefits of shared data and shared resources. Without Wi-Fi, users can't access shared information without looking for a place to plug in, and network managers need to set up the networks by installing or moving wires. Nowadays, there is again a shift in the field of connectivity. Wi-Fi also necessary for anyone to connect to the worldwide network and will let anyone to do this from anywhere and at any time.

Current Wi-Fi hotspot such as in Wi-Fi router devices or smartphone nowadays, just let the user to set the name, password and security profile. Connected client's information are unknown to the user and certain clients need to be filter from accessing the hotspot's internet access, accessing the unappropriated websites and these features can't be done without the "Wi-Fi Hotspot Manager".

Summary of problem statements for this project, are as below -

- Required special devices to setup a Wi-Fi hotspot
- Difficulty to view and manage the Wi-Fi hotspot's client
  Requirement to filter certain websites

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# **1.3 Project Objective**

Objectives for this project are to let user use their windows supported devices to turn into a wireless access point called Wi-Fi hotspot with client management capability, control internet access for certain client and to provide web filtering function to restrict hotspot clients from accessing the blacklist sites.

- To develop a manageable wireless hotspot
- To provide internet access filtering for certain client
- To implement web filtering function in a wireless hotspot system

#### **1.4 Project Scope**

#### 1.4.1 Scope of user

a) Host - User must run the program to convert the Windows devices into a Wi-Fi Hotspot (act as wireless access point) to share their current internet access to the clients that connect through the hotspot. Through the program, user can view client's information and manage their internet access. There are three categories of interface provided which are for activating or deactivating the Wi-Fi hotspot, view or managing the client information such as their name, IP address, MAC Address and their internet access (filtering function). Next, user also can block certain website using the web filtering function to block any connected clients from accessing it.

**b)** Client - Client can connect to the Host through their Wi-Fi adapter by connecting to the correct SSID and password that provide by the Host.

#### 1.4.2 Scope of module

a) Create Hotspot – Can activate and deactivate the Wi-Fi hotspot on Windows OS devices.

b) Manage Hotspot – Can change the hotspot setting such as SSID name,

password, filter certain clients and analyse the connection.

c) View Client – Can show clients list with their name, MAC address and IP address that connected to the Wi-Fi hotspot.

**d**) **Manage Client** – Can manage clients connected to the Wi-Fi hotspot such as their internet access.

e) Website Filtering – User can add blacklist website to the system to block any connected users from accessing it.

#### **1.5 Project Contribution**

Project contribution defines the expected output from this project. At the end of the project, there should be a working program for Windows OS devices that can share their current internet connection through their Wi-Fi adapter (called Wifi Hotspot).

It is a web-based graphical user interface that able to create and manage wireless hotspot in supported windows devices. The program must be able to be activate, deactivate, manage hotspot SSID and password, and able to view the client connected to the hotspot with their details such as devices name, MAC Address and IP Address. Through this program, user can manage and monitor client's activity as long as they are connected to the hotspot and filter any website either it is allow to access or blocked to them. Any advanced or beginner users (lack of IT knowledge) should able to interact with the program successfully.

## **1.6 Conclusion**

As a conclusion, this chapter helps to comprehend the project background, the objective to be achieve and issues happened in the networking field. Based on the related topic and subtopic of this chapter which is the problem statement, project objective, and expected output, this study wants to make some enhancement to the current Wi-Fi hotspot program.

Moreover, this project will provide a web-based graphical user interface to create and manage wireless hotspot in supported windows devices. Through this program, user can manage and monitor client's activity as long as they are connected to the hotspot. Any users that need of internet sharing anytime and anywhere they want, can be done by accessing the program through any of their Microsoft Windows supported devices and managing the connection through the simplest interface that can be achieved in this project.

# **CHAPTER II**

#### LITERATURE REVIEW

#### 2.1 Introduction AYSIA

In this phase, the literature review of Wi-Fi Hotspot Manager will be shown with current project details and comparing this system with previous research that carried out with the same scope of project.

Wireless Fidelity is a relatively latest technology which enables people to connect to IP networks (such as the Internet) without any network wires connected to their computer. Wi-Fi can operate in two modes, ad hoc mode and infrastructure mode. Ad hoc mode (referred to as IBSS, or Independent Basic Service Set) refers to direct connections between exactly two computers, with the same possibilities as a serial cable. Infrastructure mode is the more interesting mode of Wi-Fi, it basically works the same as an Ethernet but without using network wires. This mode is what the name WLAN (Wireless Local Area Network) refers to and it's concept are being implement in this project.

The standard wireless local area network (WLAN) technology is for connecting computers and myriad electronic devices to each other and to the Internet. Wi-Fi is the wireless version of a wired Ethernet network, and typically set up for Internet access, anyone entering the hotspot with a Wi-Fi-based laptop, smartphone or tablet can connect to the Internet, providing the access point is configured to advertise its presence (beaconing) and authorization is required, so the client must know the password that has been setup by the host. For Wi-Fi Hotspot Manager, after configuring the hotspot requirement as in SSID, password and internet source, it also provide the user to view and manage the connected clients and report the data usage alongside with the connected clients, then present its information through the system for user to analyse the connections.

According to JiWire, Inc., at the beginning of 2010, "There were more than a quarter million public hotspots around the world. However, every home or business Wi-Fi network is a hotspot, and if the wireless router is left in its default state, which advertises its presence and does not require a password, it too is inadvertently a public hotspot."

# 2.2 Related Work / Previous Work

### 2.2.1 Domain

This topic discusses the related search and findings that relate to this project. Wi-Fi Hotspot is the major areas as the domain of literature to be reviewed.

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### Wi-Fi Hotspot

According to Melanie Pinola (IT administrator and Art Director for a marketing and business development agency) "Wireless hotspots are wireless access points, typically in public locations, that provide internet access to mobile devices such as your laptop or smartphone when you are away from the office or your home. Typical Wi-Fi hotspot venues include cafes, libraries, airports, and hotels. Hotspots make it possible for you to get online wherever you go, but they come with some security concerns."

All devices that wish to have a wireless network connection (from now on called wireless clients), associate (make a connection and authenticate) with the host that establish the hotspot through this Wi-Fi Hotspot Manager system. This can only

be done when the device with Wi-Fi capable hardware is in the range of the access point, as states by Bradley Mitchell (Cisco Press's technical reviewer) "A general rule of thumb in home networking says that WiFi routers operating on the traditional 2.4 GHz band reach up to 150 feet (46 m) indoors and 300 feet (92 m) outdoors. Older 802.11a routers that ran on 5 GHz bands reached approximately one-third of these distances". Once a connection with the access point is established, the wireless client can begin performing network operations, just like in a wired network. And just like on a wired network, clients of wireless networks will have to share the available bandwidth. Wi-Fi introduces advantages, some of which include the fact that wires are no longer needed to interconnect all computers of a network.

#### **2.2.2 Domain Problem**

Around 1995, connectivity (with connectivity in this document is meant: having the possibility to connect to some public computing network such as the Internet) wasn't part of common life. People used to communicate with one another by means of letters, telegraphy and telephone. With the introduction of computers this gradually changed. First some computers were connected to create a network called ArpaNet, initiated by American military and educational institutions. Later on, in the nineties, the Internet was formed out of the former ArpaNet, connecting computers to each other worldwide, creating a huge network of computers. The Internet introduced connectivity to the home. Anyone with a desktop computer at home was able to connect to anyone else by the Internet, in a matter of minutes.

Nowadays, there is again a shift in the field of connectivity. It's not just possible for anyone to connect to the worldwide network, it is possible for anyone to do this from anywhere, and at any time. With the introduction of technologies such as GPRS, UMTS, and Wi-Fi (Wireless-Fidelity), mobile access to the Internet has become possible. The last of these technologies, Wi-Fi (also known as WLAN), will form the basis for this project.

#### 2.3 Critical Review of Current Problem and Justification

#### 2.3.1 Background of current program

Whether we want to share a wired connection with our friends or just link multiple devices into a single Ethernet connection, having our own portable Wi-Fi hotspot can come in handy. Windows can turn a laptop (or desktop) into a wireless hotspot, allowing other devices to connect to it as long as it is from Windows 7 and above with wireless adapter attach to it.

With Internet Connection Sharing, it can share our current Internet connection whether it is wired or wireless with those connected devices. There are more programs available on the internet nowadays to achieve this feature and three of them which are Maryfi Virtual Router Software(1), OSToto Hotspot(2) and LionScripts WiFi Hotspot Creator(3) will be analyse for their functionality and weaknesses.

#### a) Maryfi Virtual Router Software

Maryfi virtual router software which is a simple and free software which helps user in creating Hotspot on their Windows machine. With Maryfi, users can wirelessly share any Internet connection including a cable modem, a cellular card, or even another Wi-Fi network. Besides, this program don't need any internet connection to create a Wi-Fi hotspot. The feature helps in creating a shared library of folders and playing LAN based games without using any physical wires. The only drawback of this software is that it doesn't support Windows 10.

# **User Interface :**

-	Settings
	Wi-Fi Name Maryfi
	Password View
	View Network Connections to Setup Internet Sharing
	Help
	Maryfi How to use
	About Maryfi
	Support
AL MALA	Network Status           Maryfi:         Off         Start Hotspot           Internet:         Connected
Benefits :	Figure 2.1.1 : Maryfi user interface
Simp Fast	ole user interface
• Shar UNIVERS	ed library of folders features

- Does not support Windows 10
- Can't view and manage clients

#### b) OSToto Hotspot

OSToto Hotspot packs usual features including the ability to create Hotspot, blacklisting device, and using WPA2 PSK security protocol. Other features of OSToto are the ability to set a timer to automatically switch off the Hotspot and allowing the hotspot to run even when the PC is hibernating. For these two features alone, OSToto Hotspot made a huge innovation in this field, yet still lacking in term of client and usage management.

# **User Interface :**



Figure 2.1.2 : OSToto Hotspot user interface

#### **Benefits :**

- Simple user interface
- Blacklisting devices
- Timer to automatically switch off the hotspot
- WPA2 PSK security protocol

# Weaknesses :

- Does not support Windows 10
- Basic view of connected clients
- Can't manage clients

# c) Baidu WiFi Hotspot

The first and foremost task of a Hotspot software is creating Hotspot, and Baidu handles this task perfectly. The connection is fast and secure and user wouldn't feel any drop in connection speeds on their connected devices what so ever. Apart from creating Hotspot, the software also allows user to send and receive files from devices that are connected to the WiFi hotspot which is a good additional feature compare to others. The user interface of this software is fairly modern and really easy to navigate.



Figure 2.1.3 : Baidu WiFi user interface

#### **Benefits :**

- Fast connection
- Can send files to the connected clients
- Modern interface

## Weaknesses :

- Contain advertisement for free version
- Can't view and manage clients
- Can't block websites

# **2.4 Proposed Solution**

The proposed solution for this project is to create a system consists of three main functionalities that able to outstand other products which are establishing the wireless access point with internet access, managing the clients connected to the hotspot, also can view their information such as their IP address, MAC address and hostname and able to block certain website from being access by the clients. A minimal running system should be delivered, while at the same time designing the system in such a way that enhancements can be implemented easily.

During the analysis phase, it will look at the existing system. In this phase the problem domain is identified. Users which play a role in the system are identified. An identification of the use of the system takes place. In the design phase, the system is designed on an abstract level. The involved hardware is defined and described. The decomposition of the system into subsystems is described. Further, choices regarding persistent and temporary storage are also decided upon in the design phase. The design phase is followed by the implementation phase, in which the object design and the actual implementation of the system is performed. Finally, the evaluation phase follows, in which the system is tested to see if it meets expectations.

Besides the creation of the system, the thesis project consists of the creation of a report documenting the project. The basis for this report (notes, pieces of text, images) is created in-line with the project. The actual creation and finalization of the report takes place at the end of the thesis project.

## **2.5 Conclusion**

The purpose of this literature review was to study existing system and see how wireless technology can be implemented and exploited in our daily life. As the conclusions, the review of the past project and some interpretations of these results will be given. This chapter will also include a general discussion of the study as it was provided by varieties of reference and how it was perceived in order to finish this project.

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# **CHAPTER III**

#### **PROJECT METHODOLOGY**

#### **3.1 Introduction of Project Methodology**

In this phase, the methodology and planning to develop the program will be explained whether it is in terms of high-level project requirements, system development techniques and project planning. Before developing a system, we have to provide a medium of work requirements which are the software requirements and hardware requirements to be used. Additionally, it is very important to use the correct system development techniques as in System Development Life Cycle (SDLC) to be appropriate to the way our system will be built and in this case of "Wi-Fi Hotspot Manager" program, we use the Waterfall SDLC technique as it can facilitate the development of the program as we can develop the program with a straightforward process and it is a step-by-step nature of the method itself. An absolute planning and analysis need to be done neatly and make sure that every details included during the process before proceeding to the development of the program.

# **3.2 High-Level Project Requirements**

# **3.2.1 Software Requirements**

**Development Tools -** Sublime Text Editor, Windows Command Prompt, Windows PowerShell

**Operating System / Server -** Microsoft Windows 8, Xampp (Apache)

Database - Xampp (MySQL)

# **3.2.2 Hardware Requirements**

- Personal Computer (Laptop)
- Internal Wifi adapter



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For this system, Waterfall methodology is being used as a System Development Life Cycle (SDLC) approach. Waterfall Model is a traditional model and it always seen as flowing downwards like a waterfall. The waterfall through many different phases such as Planning, Analysis, Design, Implementation and System Maintenance. The previous phase must be completed first before proceeding to the next phase.



# Figure 3.1 : Waterfall SDLC

#### **Phase 1: Planning**

In this phase we need to focus on current issues to decide the project titles, plan the system and development methods that need to be done to complete this project. The project commences on 12 February 2018 and is expected to be completed on 15 May 2018 which takes 3 months to be completed.

Complete system proposal should be submitted and revised on 18 February, 2018 which includes the problem statement and the objectives of this project. Subsequently, the system development process can be continued until the deadline set according to the project plan that has been prepared.

# Phase 2: Analysis

During the analysis process we need to try out existing Wi-Fi hotspot program that available in the internet one by one as a real user to get the first impression of each program tested. To be precise there are three different program that will be tested which are Maryfi Virtual Router Software(1), OSToto Hotspot(2) and Baidu WiFi Hotspot (3). This phase are compulsory for obtaining clear information about how the program works, the weakness of current program and the analysis of the need for a new program to be developed.

#### Phase 3: Design

The design phase is where we will design the entire system aspect starting from the input and output system, database and computer process for the system. This phase is divided into two, namely logical design and physical design. The logical design needs to be completed first which explains the system interface logically before it is translated into physical form. This phase is to be completed on 15 March, 2018 which includes both aspects of logical and physical.

#### **Phase 4: Implementation**

The first part of the implementation is coding. Coding is required to determine how this system works for each section of our system design. Through the program's code, all the connection between the operating system, hardware and database are link through this process. In the second part, the installation is required by installing the program with a fully functional database and user interface according to the coding of the first part. Last part, testing on the system will be implemented and introduced the system to the first stage users.

## Phase 5: System Maintenance

For system maintenance's phase, changes will be made to the system according to the hardware and software requirement that keep advancing nowadays. This change is needed to keep the system running smoothly and stay relevant in time. Documentation and system presentations will be made on May 15, 2018.

#### **3.4 Project Milestones**

Planning and milestones are frequently used to monitor the progress, but there are limitations to their effectiveness. They usually show progress on the critical path only, and ignore non-critical activities.

	Milestone	Due Date (week)				
	Sent proposal for project suggestion	Week 1				
	Submit proposal in online system	Week 3				
	Start analysis process	Week 4				
N	Start design process	Week 5				
	Start implementing process	Week 8				
	Project Presentation	Week 14				
	Project Complete and submit all the documents	Week 14				

 Table 3.1 : Milestone

According to the milestone from Table 3.1, there are seven task needed to complete by referring the target of this milestone. For the first task, student need to prepare and sent proposal of the project on week 1 for further process of agreed proposal title to the committee (Dr. Nurul Azma). Second, student need to submit proposal in an online system (e-Repository) for further reference by supervisor and committee on week 3. On week 4, analysis process phase started where student will investigate by through study of other existing system and information systems used, identify improvement opportunities and develop a new concept for system.

Next, in design process phase, analyst design all aspects of the system, starting from input and output screens until the preparation of reports, databases and computer processes. Task five is implementing process such as coding implementation where programmers write the programs that make up the system and must started on week 8. Task six is where student need to prepare for presentation on week 14. Lastly, the project must be successfully completed and all document must be submitted to the supervisor and evaluator by week 14.

WEEKS TASKS	1	2	3	4	5	6	7	8	9	10	11	12	13	14
PLANNING														
Briefing														
Discuss project title														
Identify project requirement														
Discussion with lecture.														
Sent proposal for project suggestion	w h	Π												
Submit proposal in online system						5		V						
ANALYSIS	) <	2	i -		~ (	ŝ.	w	1	اود					
Start analysis process	KN	KA	LN	IAL	AY:	SIA	ME	LA	KA					
Identify problem														
Analyse current system														
Discuss with lecturer														
Complete Analysis														
DESIGN	1		1											
Start design process														
Discuss with lecturer											<u> </u>	<u> </u>		

Sketch design												
Create program												
Design process complete												
IMPLEMENTATION												
Start implementing												
process												
Coding												
Installation												
Programmers and analyst												
test system												
Discuss with lecturer	u h							V				
Identify problem								V				
Modify system												
MAINTENANCE	) =	2	÷		200 (	5:	~	rig.	اود			
Real user test_RSITI TE	KN	KA	LN	IAL	AY	SIA	ME	LA	KA			
Alter the system												
Documentation report												
Project Presentation												
Project Complete and												
submit all document into												
online system												
	1	1	1	1	1		1	1	I	1	1	

# **3.5** Conclusion

As a conclusion, every project will have a different methodology that is being used to carry out the project successful and working well. Selecting System Development Life Cycle (SDLC) approach is an important part as it will guide on how the project will be execute till it is complete. Thus, this SDLC is the most suits regarding this project as it has to be carry out step-by-step with earlier preparation. With appropriate steps and methodology, any process of completing the project can be managed wisely and will result in smooth and successful task.



# **CHAPTER IV**

#### **ANALYSIS & DESIGN**

#### 4.1 Introduction

This chapter will discuss the analysis phase and design phase. The analysis process is an important step in order to create a better and efficient program. By doing the analysis to the current program and proposed program, we will get some information about currently available program on the internet so that the proposed project can be develop successfully and have more additional features that needed in today's technology.

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On design phase it will describe system requirements literally, user interface, database design, input and output format, and processing logic. It also provides a user interface diagram with a description of each available features. Additionally, the system interface is organized in order to make it easier to understand and to reveal how it works in accordance with the steps provided.

System database design also provided to expose on how the program works and what entities are required for each system input and output. Additionally, the data dictionary contained in this section provides detailed database information for each attribute contained in the system database table. Design chapter is divided into three (3) categories which are system architecture design, database design and graphical user interface. Each of this design process is important in order to develop a system according to the user requirements. It will help in develop an interactive and enhance system.

#### 4.2 Problem Analysis

#### 4.2.1. User interface and human factors

• User friendly access to the system: It should be possible for user to use the system without (too many) adjustments to their computer system. The user can use the system's function without modifying the configurations manually.

#### 4.2.2. Hardware consideration

• Access Point (AP) hardware: Hardware is needed for the access points. The network interface should support running on Windows 7 to the latest one which is Windows 10. This hardware also need to support the hosted network functionality provided by Windows which almost all the latest network cards are probably support this features.

#### 4.2.3. Quality issues

• Fair use: Bandwidth as made available by the system is divided (roughly) evenly among all connected clients, it shouldn't be possible for one user to block out another by means of heavy downloads or uploads.

### 4.2.4. Manageability

• Client's access: Clients access to the internet should be configure within the system. This feature emphasizes hotspot capability and restrict the client that should not have access to the network.

#### 4.2.5. Website Access

• Domain's blacklist: Certain websites that are not appropriate to the clients should be block which referring to their content such as contain extreme politics issues, religious extremism, pornography or any entertainment sites that should not be access during work hours or should not be access at all.



In this section, it will describe the data that requires to be used in the system. The attributes are the fields in the table. The data requirements of Wi-Fi hotspot manager are described in more detail in the Table 4.1 below.

Table 4.1. Data Requirement											
Attribute	Data type	Length	Content	Example							
		Table A	dmin								
Username	varchar	50	Username	Admin							
Password	varchar	50	Password	12345678							
		Table Se	tting								
settingID	int	10	Setting ID	1							
Name	varchar	100	Hotspot Name	SSID							

Table 4.1	:	Data	Requirement
-----------	---	------	-------------

Password	varchar	100	Hotspot	12345678			
			Password				
Source	varchar	50	Internet Source	Ethernet			
Table Client							
MAC	varchar	100	MAC Address	78-E3-B5-80-C7-1D			
hostname	varchar	255	Client's name	Android777			
status	varchar	10	Allow, Block	A=allow, B=block			
Table Session							
session_ID	int	10	Session ID	1			
date_start	varchar	100	Start date	09-01-2018			
date_end	varchar	100	End date	10-01-2018			
time_start	varchar	100	Start time	09:02			
time_end	varchar	100	End time	10:02			
Table Log							
log_ID	int	10	Log ID	1			
MAC	varchar	100	MAC Address	78-E3-B5-80-C7-1D			
Session_ID	int	10	Session ID	1			
Table Filtering							
Blocked_URL	varchar	100	URL .	www.fast.com			

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# 4.3.2 Functional Requirement

#### 4.3.2.1 Context Diagram

Context Diagram show the interaction between a system and process which the program is designed through the interface. There are three main parts of its which are User (the host), Wi-Fi Hotspot Manager (the program) and Clients (connected to the host).



Figure 4.3.1 : Level-0 DFD
### Level-1 DFD for Process 1 (Hotspot setting input)



Figure 4.3.2 : Level-1 DFD for Process 1

Table 4.2.1 : Process 1 description						
Process	Hotspot setting input					
Purpose	To set the hotspot configurations					
Definition	There are 3 subs process involved :-					
AIND	1. Receive input from user					
با ملاك	Process involved inserting SSID name,					
-	password and source.					
UNIVER	ST 2. Retrieve input of SSID, password, source and					
	activation					
	The input from the text fields and radio button					
	will be read by the system. The activation button					
	will determine whether the hotspot is activate or					
	not.					
	3. Store the input in database					
	All the configurations input will be save in the					
	database after clicking the activation button.					
Responsibility	User					

### Level-1 DFD for Process 2 (Create hotspot)



Figure 4.3.3 : Level-1 DFD for Process 2

4AL MAL	Table 4.2.2 : Process 2 description
Process	Create hotspot
Purpose	Process to start the hotspot
Definition	There are 3 subs process involved :-
in with	1. Receive setting information
يا ملاك	Retrieve the hotspot's configuration from the
	database.
UNIVER	2. Sort the setting into a sequential command
	Use the configurations retrieved from the database
	and sorting it into an executable command line.
	3. Execute activation command
	Process that run the sorted command in Windows
	CMD through the PHP.
Responsibility	User

### Level-1 DFD for Process 3 (Manage clients)



Figure 4.3.4 : Level-1 DFD for Process 3

MAL	AYSIA
Process	Manage clients
Purpose	Process for managing the clients
Definition	There are 4 subs process involved :-
S A ALING	1. Run ARP command
ch l (	Process involved running arp –a command
با ملاك	through command prompt to view arp table.
UNIVER	2. Retrieve connected client's information Read the arp table of hotspot's IP subnets
	3. Use the client's IP information
	From the arp table, find the client's IP address.
	4. Retrieve name through ping command
	Using ping –a command to get the hostname of
	clients' IP address.
Responsibility	User

# Level-1 DFD for Process 4 (Connect to the hotspot)



Figure 4.3.5 : Level-1 DFD for Process 4

ALAYSIA					
Process	Connect to the hotspot				
Purpose	Process for connecting to the hotspot through client's device				
Definition	There are 4 sub process involved :-				
Sta Alm	1. Select the hotspot name				
با ملاك	Scan for the Wi-Fi through client's device and select the created hotspot's SSID.				
UNIVER	2. Enter the password SITI TEKNIKAL MALAYSIA MELAKA Enter the correct password that match with the				
	hotspot's configuration.				
	3. Connected to the hotspot				
	Process after the password authentication is				
	successful.				
	4. Using the provided IP address				
	Client will use provided IP address by hotspot to				
	have access to the network and host's shared				
	internet.				
Responsibility	Client				

<b>Table 4.2.4</b>	:	<b>Process 4</b>		description
--------------------	---	------------------	--	-------------

# 4.3.3 Others Requirement

# 4.3.3.1 Software Requirements

Туре	Software	Description			
Platform		Operating system as a platform where the			
	Microsoft	system will be uses. This system support			
	Windows Windows 7, Windows 8, Window				
		and Windows 10.			
		MySQL databases are available in all			
		major programming languages with			
Database	MySQL	language-specific API. It is used to store			
		the system configuration and client			
MALAYS	IA MA	configuration.			
NIN STATE	E.	The Apache HTTP Server is a web server			
	8	that support programming language of			
Web Server	Apache	PHP and MySQL database. Apache will			
Extension		be used to host the system on the			
de la C		Windows machine			
سيا ملاك	نيكل مليه	PHP is a reflective programming language			
-	TI TEKNIKAL PHP	originally designed for producing			
Taskaslass		dynamic web pages. Its flexibility are			
rechnology		compulsory for interacting with the			
		windows command prompt (CMD).			
Web Browser	Google	Used as web browser to access the system.			
	Chrome				
		Sublime Text is a proprietary cross-			
	Sublime Text	platform source code editor with a Python			
Development		application programming interface (API).			
Tool	Editor	It natively supports many programming			
		languages and markup languages			

# Table 4.3.1 : Software requirements

		including that been used in this system			
		which are html, php and javascript.			
	Windows	The command shell executes programs			
Development	Command	and displays their output on the screen by			
Tool	Prompt	using individual characters.			
		Windows PowerShell includes an			
Development	Windows	interactive prompt and a scripting			
Tool	PowerShell	environment that can be used			
		independently or in combination			



# 4.3.3.2 Hardware Requirements

Туре	Hardware	Description				
Device		To run the system with installed supported				
		Windows operating system				
		A wireless network interface controller				
Adaptor	Internal Wifi	(WNIC) is a network interface controller				
Adapter	Adapter	which connects to a wireless radio-based				
		computer network				
	Internal	Ethernet adapter is a card that plugs into a				
Adapter	Ethomot	slot on the motherboard and enables a				
		computer to access an Ethernet network				
MALAYS	Adapter	(LAN).				
and and a second	E.	Ethernet cable is a network cable used for				
EKA	KA	high-speed connections between two				
Cable	Ethernet Cable	devices such as computers and routers on				
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		IP networks. It is used to connect to the				
anna -		wired internet source.				
Mamany	JI2 MB	Minimum requirement to make the system				
		operate easily and smoothly.				
UNIVERSI	TI TEKNIKAL	Minimum requirement to run the system				
Hard Disk	5 GB	and installed all the software				
		requirements.				

#### 4.3.3.3 Network Diagnostic Command Requirements

Command	Description					
inconfig	Display the network settings currently assigned to any or					
ipcomig	all network adapters in the machine.					
	Displays active TCP connections, ports on which the					
	computer is listening, Ethernet statistics, the IP routing					
netstat	table, IPv4 statistics (for the IP, ICMP, TCP, and UDP					
	protocols).					
ning	Determine TCP/IP Networks IP address and assists in					
ping	resolving them					
routo	Command to manually configure the routes in the routing					
TOULE LAYSIA	table.					
arn	Displays, add, and removes arp (address resolution					
	protocol) information from network devices.					
Finatch	Display or modify the network configuration of a currently					
PAINO PAINO	running computer.					

#### Table 4.3.3 : Network command requirements

#### 4.4 High-Level Design

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# 4.4.1 System Architecture

#### Components

- a) Internet source The program offer two type of internet source sharing which are wired (ethernet) or wireless (wifi). User need to set this option on the main interface before starting the hotspot.
- b) Access point After activating the hotspot, Windows machine will turn into an access point that can view client, manage client and analyse the data connection.
- c) Clients Clients connected to the hotspot, will using IP address provide by the hotspot's DHCP and the host will receive client's information such as name, IP address and MAC address.



**Figure 4.4 : System Architecture** 



### 4.4.2 User Interface Design

Figure 4.5.1 : Main Interface

#### **Module Involve -**

- Create Hotspot Can activate and deactivate the Wi-Fi hotspot on Windows OS devices.
- 2. Manage Hotspot Can change the hotspot setting such as SSID name, password and internet source.

### 4.4.2.2 Client Manager

Secured Wifi Hotspot	Client Managar			
Hotspot Manager	Chefit Manager			
Client Manager			Search: 192.10	68.137
Website Filtering	Name	IP Address	MAC Address	Filtering
Connection Log	Dell	192.168.137.2	0F-1D-4B-24-E6-5F	Allow Access *
	Asus	192.168.137.3	AF-B5-7A-8D-D0-2B	Allow Access *
C+ Logout	hp_	192.168.137.4	70-CE-35-04-DE-FF	Allow Access *
	HACKER	192.168.137.5	9F-59-BC-22-31-0A	Allow Access *
	User	192.168.137.6	F6-51-DA-13-63-58	Allow Access *
	iPhone	192.168.137.7	7E-FE-E2-8E-FB-04	Allow Access *
	Android_9909	192.168.137.8	84-AA-CB-24-C6-C3	Allow Access *
	Huawei P10	192.168.137.9	A2-A1-75-CF-9C-02	Allow Access  Allow Access Block Access

### Figure 4.5.2 : Client Manager

Module Involve -

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- 1. View Client Can show clients list with their name, MAC address and IP address that connected to the Wi-Fi hotspot.
- 2. Manage Client Can manage clients connected to the Wi-Fi hotspot such as their internet access.

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### 4.4.2.3 Website Filtering

ier 0	Enter URL to be	block	+ ADD
Itering			
og	#	Blocked Website	Action
	1	facebook.com	× DELETE
	2	fast.com	× DELETE
	3	m.facebook.com	× DELETE
	4	web.facebook.com	× DELETE
ALAYS	5	www.facebook.com	X DELETE
HALAYS	5	www.facebook.com	X DELETE
STATE NINE S	5 Figure	www.facebook.com	X DELETE
Involve -	5 Figure	e 4.5.3 : Website Filtering	X DELETE

#### 4.4.3 Database Design

Database design is part of system development and there are various methods of how the different phases of information system design, analysis and implementation can be done. In the conceptual database design phase, the model of the data to be used independent of all physical considerations is to be constructed. The model is based on the requirements specification of the program's features.

### 4.4.3.1 Conceptual Design

Conceptual design phase will explain on how the system should work based on the requirements. It is important in order for the system to meet the user and feature requirements. Figure below shows the Entity Relationship Diagram (ERD) for Wi-Fi Hotspot Manager.



Figure 4.6 : ERD

### 4.4.3.2 Logical Design

In this phase, it will describe the data dictionary used by the program. The data dictionaries of Wi-Fi Hotspot Manager are described in more refine detail as the Table 4.4 below.

Attribute	Data type	Length	Content	Example	
		Table Ac	lmin		
username	varchar	50	Username	Admin	
password	varchar	50	Password	12345678	
		Table Se	tting		
settingID	ws/4 int	10	Setting ID	1	
Name S	varchar	100	Hotspot Name	SSID	
Password	varchar	100	Hotspot	12345678	
E			Password		
Source	varchar	50	Internet Source	Ethernet	
abel (		Table C	lient	. 1	
client_ID	int	10	Client ID	اويو	
session_ID	SITI TEKNI		Session ID	AKA	
MAC	varchar	100	MAC Address	78-E3-B5-80-C7-1D	
IP	varchar	100	IP Address	192.168.137.1	
hostname	varchar	100	Client's name	User	
filter_ID	varchar	100	Filter ID	1	
		Table Se	ssion		
session_ID	int	10	Session ID	1	
date_start	varchar	100	Start date	09-01-2018	
date_end	varchar	100	End date	10-01-2018	
time_start	varchar	100	Start time	09:02	
time_end	varchar	100	End time	10:02	
Table Log					

**Table 4.4 : Data Dictionary** 

log_ID	int	10	Log ID	1	
client_ID	int	10	Client ID	1	
Session_ID	int	10	Session ID	1	
Data_transmit	varchar	100	Transmitted	100 MB	
			data		
Table Filter					
Filter_ID	int	10	Setting ID	1	
MAC	varchar	100	MAC Address	78-E3-B5-80-C7-1D	
status	varchar	100	Filtering status	allow/block	

#### **4.5** Conclusion

This chapter explains how the current programs work and what features are needed in order to make sure the future program will overcome current program weaknesses. Furthermore, this chapter also explains briefly about how the data flow for each of the process including requirement needed such as data requirement, context diagram and data flow diagram.

Besides, this chapter also covered the design of the program that is being built which includes all type of design such as system architecture design, conceptual design, logical design and graphical user interface design. Each sector provides different structure and function but with the same objectives. All the design type is related to each other to ensure that the system works in flow and perfectly. The designs are construct and being implement to make it real and can be access by user through a web-based system.

#### **CHAPTER V**

#### **IMPLEMENTATION**

#### **5.1 Introduction**

This chapter discusses the implementation of Wifi Hotspot Manager in details. It covers the software development environment that is applied in this project. Furthermore, the software configuration management also covered in this chapter which explains the procedure and control of managing the source code version. Lastly, the implementation status of the project also be discussed which describe the progress of the development status for each of the module of this system.

#### 5.2 Software Development Environment setup

Table 5.1 below shows the hardware specifications of device used for the working environment and for developing purpose.

Item	Specification	Details
HP 1000-1201TX laptop	Processor	Intel Core i3-2328M @ 2.20GHz
	Hard Disk	256 GB
	RAM	6 GB DDR3

**Table 5.1 : Hardware Configuration** 

#### ALAYSIA

The software used to set up the development environment is described below:

1. XAMPP Server v3.2.1

XAMPP Server version 3.2.1 is used to store the system database. XAMPP Server version 3.2.1 contains several packages that configured automatically once installed. Those packages are Apache, PHP, MySQL and other packages. XAMPP is a free and open source cross-platform web server solution stack package developed by Apache Friends, consisting mainly of the Apache HTTP Server, MySQL database, and interpreters for scripts written in the PHP and Perl programming languages. Some package provided like phpMyAdmin in XAMPP is required to build this project database, which the database is stored in localhost in order to avoid the database lose in unexpected conditions.

2. Netsh (Microsoft command-line application)

Netsh is a command-line scripting utility that allows user to display or modify the network configuration of a computer that is currently running. Netsh commands can be run by typing commands at the netsh prompt and they can be used in batch files or scripts. Remote computers and the local computer can be configured by using netsh commands.

Netsh also provides a scripting feature that allows you to run a group of commands in batch mode against a specified computer. With netsh, you can save a configuration script in a text file for archival purposes or to help you configure other computers.

#### **5.3 Software Configuration Management**



The configuration environment of Wifi Hotspot Manager system requires Xampp server as a local server and browser to allow system execute networking command (Netsh through CMD) from the local server. The following diagram (Figure 5.1 and Figure 5.2) will explain the connection between the system, database, and network command shell of local host.

#### Level 1 (System Flow Architecture)

The first level will show the general system flow starting from the system interface which executed from the web browser to retrieve and process data from/to devices hardware through the netsh application. Figure 5.1 below represent the workflow of level 1 environment setup.



**Figure 5.1 : System Flow Architecture** 

#### Level 2 (Virtual Wifi Architecture)

On second level, it will show how the Netsh application execute the task and its data flow to access the hardware and produce the Virtual WiFi, abbreviated to VwiFi. VwiFi is a software layer that abstracts the wireless LAN card hardware into multiple virtual adapters and through this process wifi hotspot can be generated and seen as access point (AP) by wireless client.

This concept allows transparent sharing of limited hardware resources to many devices. VwiFi handles the connections of each adapter to ensure every adapter has an opportunity to connect to their respective networks limited by time which already preset by default from the operating system. The result is an operating system nonethe-wiser and acts as a device have multiple WLAN hardware adapters working independently. VwiFi generally is a software-based routing framework that allows the host machine to perform as a typical hardware router over a local area network.

A virtual wifi can enable a computer/server to have the abilities of a fullfledged wireless router by performing the network and packet routing functionality of the router via a software application. This is done by advertising a virtual wifi (which here referred to the Wifi Hotspot Manager) as the default gateway, backed by a group of physical routers.

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### **5.3.2 Version Control Procedure**

Rendition control is utilized by programming designers to put source code in a focal place and track distinctive forms of codes. Most form control frameworks can be incorporated with free advancement condition.

After the primary source code has been totally created, Appointment framework is put under the form control system. The usefulness of the framework will be refreshed in view of the system's progress and version progress are shown in Table 5.2 below.

Version	Description
WHM v1.0	This version only provide the full interface without any
in the second	functionality attached.
WHM v1.1	This version includes one of the main module which is creating
	the hotspot.
WHM v1.2	This version includes the module of client's information
the last	viewer.
WHM v1.3	This version provide client's management capability which is
	to control their internet access.
WHM v1.4	This version proceed with module of website filtering that need
	to access "host" file of the Operating System.
WHM v1.5	Full version of Wifi Hotspot Manager is done. Besides, admin
	authentication and error handling are also included into this
	system.

<b>Table 5.2 :</b>	Version	Control
	v er brom	Control

### **5.4 Implementation Status**

On this part, it will describe the progress of the development status for each of the component/module. Table 5.3 below contains, module name, description, duration to complete, date completed and the comments.

Module Name	Description	Complete Duration	Date Completed	Comments
Create Hotspot	Can activate and deactivate the Wi-Fi hotspot on Windows OS devices.	2 week	12 March 2018	Create hotspot done
Manage Hotspot	Can change the hotspot setting such as SSID name, password and internet source.	2 week	28 March 2018	Manage hotspot done
View Client	Can show clients list with their name, MAC address and IP address that connected to the Wi- Fi hotspot.	1 month چي ٽير	19 April 2018	View client done
UNIVER Manage Client	Can manage clients connected to the Wi- Fi hotspot such as their internet access.	MALAYSI. 2 month	A MELAKA 26 April 2018	Manage client done
Website Filtering	Can block certain website from being access by hotspot's clients.	2 month	30 October 2018	Website filtering done

 Table 5.3 : Implementation Status

#### **5.5 Conclusion**

As for this chapter summary, it explains the implementation process and tools to develop Wifi Hotspot Manager system. Some of the system's module are being illustrated with the aids of diagrams for better understanding on how the process flows and being executed. The next chapter will proceed to system testing to develop test plan for testing process of the system.



### **CHAPTER VI**

#### TESTING

#### **6.1 Introduction**

This section will discuss about the system testing. The detail includes test plan, test strategy, test design as well as the test result and test analysis. The main activities that are involved in testing phase are the system's functionality. Testers for this system will act as a user and test each of the available functions of the system. The testing is divided into several parts, which are unit testing, integration testing, functional testing, system testing, acceptance testing and regression testing. The strategy used in this testing is white-box and black-box testing and top-down testing.

#### 6.2 Test Plan

This section introduces the test organization of personal involved in Wifi Hotspot Manager system. Test environment and test schedule is explained in Figure 6.1 and Table 6.1.

#### 6.2.1 Test Organization



According to the Figure 6.1 above, Che Nukhriz Bin Che Hussin, which is the developer of this system act as a test manager of Wifi Hotspot Manager system. He plays an important role to guide the testing process and evaluate the test result. This project is tested by three different persons with different backgrounds. The first tester which is Muhd Faizal Bin Ayub, is a computer science's student majoring in software development are focusing on the system coding and its error handling parts. Second tester is Muhd Ibrahim Bin Mortadza, also a computer science's student but majoring in networking are focusing on the networks terms of the system and how its being carried out throughout the networking shell. The third tester is Muhammad Bin Sapardi which are not related of the computer science field is testing the system to represent the average users out there and testing the system as a whole for each module provided.

#### **6.2.2 Test Environment**

Testing process is carried out in an office to make sure that the process is guided under test manager. The personal computer hardware specification is equipped with at least 4GB RAM, Intel Core i3 processor and using Windows 7, 8 and 10. The most important is to use different type of Windows operating system since it supports only Windows 7 and above. Before testing process start, a brief explanation and detail's checklist will be given to the respective testers.

#### 6.2.3 Test Schedule

The following Table 6.1 below describes each task and the duration to complete the task. There are 7 modules to be test by each of the tester. Each tester will repeat same task 3 times which is the first one on Windows 7, then Windows 8 and lastly using Windows 10.

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Tester	Test Case	Schedule	Duration	
MUHD FAIZAL BIN AYUB	T_1.1 – T_7.3	25 <sup>th</sup> November 2018	1 day	
MUHD IBRAHIM BIN MORTADZA	T_1.1 – T_7.3	25 <sup>th</sup> November 2018	1 day	
MUHAMMAD BIN SAPARDI	T_1.1 – T_7.3	25 <sup>th</sup> November 2018	1 day	

#### Table 6.1 : Test Schedule

alun

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#### 6.3 Test Strategy

Based on the test schedule in section 6.2.3, this system will perform on six part of test. Each part required testing strategy, whether it is suitable for using white-box or black box testing.

White-box testing is a test that takes into account the internal behavior of a system or component. This test is also known as structural testing or glass-box testing. Three part of test will use this strategy which is unit testing, integration testing and regression testing. While the black-box testing is a test that focused more on the outputs, generates response to selected inputs and execution condition. Black-box test also known as functional testing. The user, which does not have programming background, is chosen to be the tester of this system. They need to enter correct data and examine the output response from the system. They need to sure the result is what they want.

Other than that, top-down testing is used in the integration level. The software developer is responsible in this testing. The highest level of the system (user interface) will be the first and followed by the internal mechanism.

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#### **6.3.1** Classes of tests

Functionality test is performed in the testing process of Wifi Hotspot Manager system. Functionality test is to verify that the software application functionalities are working correctly according to the design specification. During functionality test, testers need to check the system function, interfaces response, user input and installation in the devices. All of the functionality relevant test cases are explained in section 6.4.

Security test is categories as non-functional testing which is performed in Wifi Hotspot Manager system. It is a type of testing to determine the software application protects data and make sure functionality as predetermined. Security testing consider as software testing that's perform to check the application is secure condition. It checks and confirms if the application is accessible to attack, if hacker tries to hack or login to the system without any authentication.

#### 6.4 Test Design

Test design will discuss the test case of each module in test description. Test data is prepared with positive data and negative data to obtain more accurate result and actual result is recorded

**6.4.1 Test Description** 

Table 6.2.1 : Test Description

Module	Test Case ID	EKNIKAL MALAYSIA M	ELAKA Expected result
Login	T_1.1	To validate that the user login with correct username and password	Successfully login and redirect to the main interface
	T_1.2	To validate that the user login with empty field of username or password or both	An error message "Fill in the empty field" popped up at the related field
	T_1.3	To validate that the user login with incorrect username or password or both	An error message "Invalid login, please try again !" popped up
Logout	T_2.1	To validate that the user are successfully logout and redirect to login page	Logout and redirect to login page
	T_2.2	To validate the user can't access the previous page that	Does not load the previous page, instead will be redirect to the login page

		required authentication after logout.	
Create Hotspot	T_3.1	To validate that the access point are being broadcast	Client can find the broadcast SSID and connect to it
Manage Hotspot	T_4.1	To validate that the SSID or password or both fill with minimum length requirement	Client can proceed to create hotspot and values saved into database
	T_4.2	To validate that the SSID or password or both field fill with empty values	An error message "Fill in the empty field" popped up at the related field
View Client	T_5.1	To validate that connected hotspot clients are shown in client table	Clients information of hostname, IP address and MAC address are shown correctly
	T_5.2	To validate that if there is none client connected into the Wifi hotspot	Table will show no clients connected status on the clients table
Manage Client T_6.1 To connu- savec with		To validate that unique connected hotspot clients are saved into database per session with its status (internet access)	System save the clients record into session log and remember its status (internet access)
11 M88	T_6.2	To validate that client with allow internet access setting can surf the internet through their device	Client have internet access
	r Lebeiti	To validate that client with block internet access setting can't surf the internet through their device	Client doesn't have internet
Website Filtering	T_7.1	To validate that blacklist website can be added into system	Blacklist website show up on blacklist website table
	T_7.2	To validate that blacklist website can be remove from system	Blacklist website removed from blacklist website table
	T_7.3	To validate that clients can't access to the blacklist website	Clients can't access to the blacklist website and will be redirect to error page

### 6.4.2 Test Data

The test data is the real life or synthetic data. This section discuss the way of system behaves when there is no test data or invalid input test data. The test data used in this project is shown in Table 6.2.2 below for each test case:

Test Case	<b>Pre-condition</b>	Test Data	Step/Flow
ID			
T_1.1	Open login page	Username : admin	1. Open login page
	Manager system	Password : 12345678	2. Fill in the field with
T_1.2		No input for username field and password field	given username and password
T_1.3	WALAYSIA	Username : user	3. Click "Login" button
and the second se	No.	Password : 12345678	
EKO	\$	Username : admin	
I.		Password : 87654321	
200		Username : user	
	alwn	Password : 87654321	
T_2.1	Open any interface of	No input	1. Open any authenticated page
T 2.2	Wifi Hotspot		- untilentieuteu puge
UNIV	Manager that required login authentication	NIKAL MALAYSIA M	2. Click "Logout" button from the sidebar
T_3.1	Open the main hotspot	No input	1. Open the main interface
	interface		2. Click on "Start Hotspot" button
T_4.1	Open the main	SSID : Secured Wifi	1. Open main interface
	interface	Password : 12345678	2. Fill in the field with
T_4.2		SSID : Se	given SSID and password
		Password : 12345678	3 Click "Start Hotspot"
		SSID : Secured Wifi	button
		Password : 12345	
		SSID : Se	
	1	I	

 Table 6.2.2 : Test Data

		Password : 12345		
T_5.1	Open the clients	No input	1.	Open clients interface
T_5.2	interface		2.	Observe the clients table
			3.	Connect any device into system access point
			4.	Observe the clients table again
T_6.1	Open log interface	No input	1.	Open log interface
			2.	Select the latest session log
			3.	Click on view client
ane a	MALAYSIA ME		4.	Observe the client's information and their status (A=allow,
Т 62	Open clients	Internet access : allow		B=Block)
1_0.2	interface		2.	Choose a client from the table
لاك	كل مليسيا م	سيتي تيڪنيڪ	3:	Change the internet acces value into "allow"
UNIN	/ERSITI TEKI	NIKAL MALAYSIA M	<b>EL4</b> 4.	Open web browser from selected client's device
			5.	Surf the internet
			6.	Observe the result
T_6.3		Internet access : block	1.	Open clients interface
			2.	Choose a client from the table
			3.	Change the internet acces value into "block"

			<ul><li>4. Open web browser from selected client's device</li><li>5. Surf the internet</li></ul>
			Observe the result
T_7.1	Open website filtering	Website : www.fast.com	1. Open website filtering page
	interface		2. Insert the given data into website field
			3. Observe the blacklist website table
			4. Test the website from connected client
T_7.2	MALAYSIA	Website : www.fast.com	1. Open website filtering page
SILL TEKUR	ELAKA	UTe	<ol> <li>Remove the given data from blacklist website table</li> <li>Observe the blacklist</li> </ol>
	Allen .		website table
لأك	كل مليسيا م	،سيتي تيڪنيڪ	4. Test the website from connected client
T_7.3	/ERSITI TEKI	Website : www.google.comSIA ii	<ol> <li>Connect client into system access point</li> <li>Open web browser from client's device</li> <li>Surf for the given website</li> <li>Observe the result</li> </ol>

### 6.5 Test Results and Analysis

From the test description in section 6.4, Table 6.3 shows the actual result for each test case.

# Test Result for System Test Cases

Test Case ID	Actual Result	Success (S) / Fail (F)
T_1.1	Successful login to admin page	S
T_1.2	The message of "Please fill in the required information" is prompted	S
T_1.3	The message of "Please fill in the required information" is prompted	S
T_2.1	System successfully logout and redirect to login page	S
T_2.2	The system interface can't be load and redirect to the login page	S
T_3.1	Client successfully connect to the wifi hotspot	S
	Client can proceed to create hotspot and the SSID and password are saved for the next session	s KA
T_4.2	The message of "Please fill in the required information" is prompted	S
T_5.1	Connected clients information of hostname, IP address and MAC address are shown correctly	S
T_5.2	"No clients connected" status are shown on the clients table	S
T_6.1	Clients information are record into database	S
T_6.2	Client with allow internet access setting can surf the internet through their device	S

T_6.3	Client with block internet access setting can't surf the internet through their device	S
T_7.1	Blacklist website added into blacklist website list	S
T_7.2	Blacklist website successfully removed from blacklist website table	S
T_7.3	Clients can't access to the blacklist website and redirect to error page	S

 Table 6.3 : Test Results



This chapter conclude that the testing of this system is one of the important stage before it will be apply by the real user. Testing will reduce the risk for the system to fail after the deployment of the system as the testing plan covered all the outcome possibility from the system and every error handling that being predicted also tested during this process. The record of test cases and the test result will use as a references for future maintenance and enhancement. The next chapter will conclude this project by determining the weakness and the strength of Wifi Hotspot Manager, suggesting the improvement of the system and the project contribution towards the society.

#### **CHAPTER VII**

#### CONCLUSION

#### 7.1 Observation on Weakness and Strengths

Based on previous chapters, differences between Wifi Hotspot Manager and other similar products are more clear and bringing this project a step higher than it's competitors. Although with all the enhanced features that are being implemented in this system, still there are some weaknesses in it that can be improved in future.

#### Strengths

In term of strength, this is the core value for this project as on why this system should be carried out as of to improve current Wifi hotspot system that available for Microsoft Windows system nowadays.

One of the strength of Wifi Hotspot Manager, is its user friendly interface. This system is built on web-based platform using HTML, PHP ,Javascript and CSS. For the visualization part of this system, it's using a set of CSS and HTML compressed into a framework which is called "Bootstrap". Bootstrap is a well-known web-based framework that help developer to design websites faster and easier. The main advantage by using Bootstrap is the interface will look nice and provide responsive effects that will attract more users into using the system.

Moreover, Wifi Hotspot Manager also better than most of the other products for its additional features. There are three features that are important in Wifi hotspot system. The first feature is interface that shows hotspot's clients information, secondly function to manage internet access and lastly to filter the websites that can be accessed by the hotspot's clients. The first two features are already implements in some of the Wifi hotspot system but the difference is Wifi Hotspot Manager save the clients information in a database to keep track their status and log their connection session. This third feature which is filtering the websites is exclusive because none of the available products on the internet nowadays are offering this. Through the system, we can add the blacklist websites using their domain name and any attempt to access those websites will be blocked.

#### Weaknesses

For any developed system, it's normal if there are some weaknesses in the earlier stage of the published systems due to lack of feedback from real users with their different types of hardware and environment. Weaknesses also come from either the problem are overlook by the developer or it's due to restricted functions that are offers by the operating system itself which are referring to this project.

One of the weaknesses of Wifi Hotspot Manager is it can't block the user at layer 2 (Data Link Layer) of OSI Model which lead to the user are still able to connect to the Wifi hotspot but have no access to internet because all the blocking internet access is done on layer 3 (Network Layer) by rerouting the selected devices to a null IP route to gain the result.

Next, in testing phase there are no testing regarding the performance based on the number of devices connected to the hotspot. It's stated by Microsoft itself that maximum number of clients are depends on the hardware's capability and the administrative configuration, but there are some feedback that it doesn't support the exact same number of clients as shown by the system. As for the laptop, number of clients allowed are lower comparing to the devices that are specific it's functionality to provide the access point only. This is because the wireless adapter are not meant to replace actual wireless access point devices which already engineered it's hardware to provide more stability and more reliable. Due to this, the number of clients that can
connect to the laptop's access point are small and implementing connection log features into the Wifi Hotspot Manager system are slightly irrelevant.

Lastly, this system only support Windows operating system. As todays, there are many other operating systems available that support the same hardware as Windows such as Linux, Mac OS and perhaps the mobile device with current high-technologies peripherals, the only restriction is the command used by each operating system is different but with enough time and knowledge this can be achieve in the futures.

## 7.2 Propositions for Improvement

Based on the identification of weakness of Wifi Hotspot Manager, suggestion of improvement to help in solving the problem faced and increases the functionality and efficiency of Wifi Hotspot Manager.

From the problem of blocking user's internet access, the system can be improved so that it able to block the user at layer 2 (Data Link Layer) of OSI Model. The users will not be able to connect at all to the hotspot access point compare to current system which the users still connect to the Wifi hotspot although it's been blacklist from the system. To achieve this, the system need to directly interact to the operating system's WLAN service instead of query the process from application like Netsh and others hosted network APIs.

Second improvement is to create the system that support different types of operating system. This idea actually possible since that the concept is the and had been implemented by some advance user of other operating system through their command line as well. Some of the system out there on the internet also have been developed with the same purpose, but still they do not enhance the features of virtual Wifi concept into the next level and offers more handy features.

## 7.3 Project Contribution

Wifi Hotspot Manager have a huge contribution to today's IOT (Internet of Things) as being connected using wireless technologies is becoming more popular every day. More people are using wireless technologies every day. Wireless technologies are becoming a part of people's lives, either personally or professionally or both. People are counting on wireless technologies to be able to do their work more efficiently, resulting in a great dependence on these technologies. The fact that the society is becoming wireless connected makes it socially relevant. Sharing the internet through Windows's devices becoming easier with a lot functionality to ease them with the internet access and give them some exposure what today's computer science networking field are capable of.



As for the project's conclusion, the main objectives have been achieved and all the features can run successfully and systematically on the supported devices. All the requirements also have been fulfilled. Furthermore, the system still can be improved in future to make it more reliable and more efficient with some additional features.

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## APPENDICES

1) Source code for starting/stopping hostednetwork (snippet)

Start

runQuery("INSERT INTO `session`(`session\_ID`, `date\_start`, `date\_end`, `time\_start`, `time\_end`) VALUES ('','\$systemDate','','\$systemTime','')
 ");
 shell\_exec('netsh wlan set hostednetwork mode=allow keyUsage=temporary ssid="'.\$ssid.'" key="'.\$pass.'"');
 shell\_exec('netsh wlan start hostednetwork');

Stop

exec('arp -a -d');// CLEAR ARP CACHE TABLE
//shell\_exec('netsh wlan stop hostednetwork');
shell\_exec('netsh wlan stop hostednetwork');
shell\_exec('netsh wlan stop hostednetwork');

2) Source code for viewing clients information (snippet)



3) Source code for blocking client's internet access (snippet)



4) Source code for website filtering (snippet)



6) Hotspot's client with internet access = block

