E-SAMAN SYSTEM USING GSM TECHNOLOGY

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ABSTRACT

Information system can be defined as a set of interrelated components that collect, process, store and distribute information to support decision making and control in an organization besides supporting decision making, coordination and control. Information system may also help managers and workers analyse problems, visualize complex subjects and find the best solution in decision making. Based on experience current technique or manual method in the operation management of summons is by writing all summonses of students into log books or using piece of paper. This technique can make waste of paper and data about summon. If papers of summon are losing it can make loss of summon information. UMP security guard office use the paper as summon medium is not suitable because it UMP is engineering university and it not secure because all staff of UMP security guard officer can summon people without any offenses. E-Saman system using GSM modems are solution for this problem. This system will store the summon information automatically and offender receive the message information about traffic offender. This system is combination two systems are mobile and GSM modem. The security officer summons the offender using mobile application and sent the information into database. The administrator will sent message to offender using GSM modem system. The technology using for this system are GSM modem and mobile application. Other technologies are included such as Adobe Dreamweaver and Microsoft vision. All there technology use to make this system more prefect and useable. The result form these systems are the security officer easy to summon offender and can save paper and time. The administrator also more easy to manage the system and can send message to offender using GSM modem. The user also can check their summons using this system

ABSTRACT

Sistem maklumat boleh ditakrifkan sebagai satu set komponen yang saling berkaitan yang mengumpul , memproses, menyimpan dan menyebarkan maklumat untuk menyokong dalam membuat keputusan dan kawalan dalam organisasi di samping menyokong membuat keputusan, penyelarasan dan kawalan . Sistem maklumat juga boleh membantu pengurus dan pekerja menganalisis masalah , menggambarkan subjek yang kompleks dan mencari penyelesaian terbaik dalam membuat keputusan. Sistem maklumat mengandungi maklumat tentang orang-orang besar , tempat dan benda dalam organisasi atau dalam persekitaran yang mengelilinginya. Berdasarkan pengalaman semasa teknik atau kaedah manual dalam pengurusan operasi saman adalah dengan menulis semua saman pelajar ke dalam buku log atau menggunakan sehelai kertas . Teknik ini boleh membuat pembaziran kertas dan data mengenai saman . Jika kertas saman kehilangan ia boleh membuat kehilangan maklumat saman . Keselamatan UMP pengawal pejabat menggunakan kertas sebagai medium saman tidak sesuai kerana ia UMP merupakan universiti kejuruteraan dan ia tidak selamat kerana semua warga UMP keselamatan pegawai pengawal boleh memanggil orang tanpa apa-apa kesalahan . Sistem E - Saman menggunakan modem GSM adalah penyelesaian untuk masalah ini . Sistem ini akan menyimpan maklumat saman secara automatik dan pesalah menerima maklumat mesej mengenai pesalah trafik . Sistem ini adalah gabungan dua sistem adalah modem mudah alih dan GSM . Pegawai keselamatan dengan firman pesalah yang menggunakan aplikasi mudah alih dan menghantar maklumat ke dalam pangkalan data. Pentadbir akan menghantar mesej kepada pesalah menggunakan sistem GSM modem. Teknologi yang menggunakan sistem ini adalah modem GSM dan aplikasi mudah alih. Teknologi lain dimasukkan seperti Adobe Dreamweaver dan Microsoft penglihatan. Semua ada penggunaan teknologi untuk menjadikan sistem ini lebih pengawas dan boleh digunakan. Membentuk hasil Sistem ini adalah pegawai keselamatan yang mudah untuk menyaman pesalah dan boleh menjimatkan kertas dan masa . Pentadbir ini juga lebih mudah untuk menguruskan sistem dan boleh menghantar mesej kepada pesalah menggunakan modem GSM. Pengguna juga boleh menyemak saman mereka menggunakan sistem ini

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CHAPTER 1

INTRODUCTION

1.1 Background

According to Rosdy (2005), information system can be defined as a set of interrelated components that collect, process, store and distribute information to support decision making and control in an organization besides supporting decision making, coordination and control. Information system may also help managers and workers analyse problems, visualize complex subjects and find the best solution in decision making. Information systems contain information about significant people, places and things within the organization or in the environment surrounding it. Information system knowledge is essential for creating successful, competitive firms, managing global corporations, adding business value and providing useful products and services to customers.

Nowadays, an information system is very important instrument for creating value for the firm. Information systems enable the firm to increase its revenue or decrease or that improves the execution of business processes. It also increasing the efficiency and accuracy of the organization information and indirectly increasing productivity of an organization. Based on experience current technique or manual method in the operation management of summons is by writing all summonses of students into log books or using piece of paper. This technique can make waste of paper and data about summon. If papers of summon are losing it can make loss of summon information. UMP security guard office use the paper as summon medium is not suitable because it UMP is engineering university and it not secure because all staff of UMP security guard officer can summon people without any offenses.

However, as the information technology advanced, the conservative implementation has needed to be changed to electronic management concept. The E-Saman system is the new concept of system management where the entire organized summons will be supervised by on-line and offline system. This new concept of system management will help the Security Department of UMP to control the students and staff summon so that it will be more effective and efficient. The E-Saman system is actually required for the university in order to prepare it towards the World Class University. The system can represent the university to the outside world. It will be a symbol of the reputation of our university by using computerized or advance technology in the management information system.

1.2 Problem Statement

Security Department at UMP is currently using the manual system in handling the student's summons. Thus, the usage of the current system is less effectives and less systematic where the employee in the Security Department has to recheck the students summons manually. Summons in the UMP system still use the current system where a security guard using paper to record the offense before being stored into the database. According to Captain Azam Bin Ahmad, UMP Security Officer, their staffs have to spend a lot of time to recheck thousands of students' summonses. Summons rechecks is important to ensure that all summonses are added into database to facilitate students and staffs look back their previous summons.

This situation, involves high costs in paying staffs' overtime-working hours. Besides that, it creates troublesome to the staff especially during the university's convocation season. Almost thousands of summonses need to be rechecked and after that, they have to send notices to student directly to their address. Students are required to pay for summons because it treated as debt by the university. Students have to pay summons before they are eligible for transcript. Because of that reason, this project is proposed to ensure all the problems relating to students summon can be solved and indirectly can help the UMP by gearing its processes to the computerized system. The current system is not secure for student and staff because summon can make as a randomly, it just use the paper and not need any personal information just

id from card matric. If UMP security guard office knows the number of matric card, it can make summon and give the paper of summon to offender or just save into log book summon information.

The current system may bring to the data error or incorrect data when the officer records the data into the system. By Using the previous system may lead to the small mistake such as numbers, date or spelling. These types of mistakes will affect the information and the wrong documented information will be transfer in to the system. As a result, by using the new system, those types of errors can be avoided and it is easier to be organized. On the other hand, the manual documentation may cause the data lost. This is because the information is only recorded in a piece of paper and it will be given to the offenders. The paper may lost and missing.

1.3 Goals & Objective

The goal of this project is to develop an E-Saman System in UMP. The following *objectives* are set:

i. To identify vulnerabilities of E-Saman system by performing test on the system.
ii. To develop E-Saman system with database system and JSM system.
iii. To improve security of technical system by adding some additional security to E-Saman.
iv. To perform testing on the system and finding any deficiency for further improvement

1.4 Scope

1. **Database System and Global System for Mobile Communication (GSM).**
   This system is developed to store the database of E-Saman System. The data will be saved directly into database or memory card. The information from the database will be send to the offenders by using a system called GSM

2. **System User**
   The system target user is the UMP Security officer. The UMP security officer use this system to record the offense did by the student and staffs. The records will be automatically inserted into the database

3. **Function**
   The function of the system is to help the ump security officer in documenting student and staff traffics fault. The fault is directly recorded into the database and JSM system will send the data to the offenders through SMS

1.5 Methodology

Figure 1.1 shows the stage of System Development Life Circle (SDLC). This SDLC is choosing because it fits the approach for developing the system which relies on technique the produce deliverables intended. SDLC present guidance for selecting appropriate methods, technique and tools based on the specific requirements for the project. With this approach, project is desired to move consecutively according to steps planned for each phase. The phases involved for this project equipment are planning, analysis, design and implantation and lastly the maintenance phase. All of the phase or step duration of this system complete can be referred as in the Gantt chart at appendix A

Figure 1.1: System Development Life Circle (SDLC) for E-Saman system

1.5.1 Planning

The project is identified in the planning phase. The title for this project is E-Saman System that function using android application and save data into database. After that, the system will sent the information using short message service (SMS). Once the project title is identified, data about E-Saman system are collected and requirement regarding the project are gathered. At this point, lot of research is needed to be done for obtaining ideas on how to implement the project and gathering requirement to fulfill the project needs. Information from current system is studies for example methods available for current E-Saman system and what are the advantages and disadvantages for the existing Summon system. With that information, research can be done to find if any improvement can be done to provide a better system. The most important thing that need to be planned is time schedule for develops the project is specific period. Apart for that, the planning phases involve preparation to know how the E-Saman system is going to be developed and why the system is to be built.

1.5.2 Analysis

In this analysis phase, analysis of the current summons system and its problem are made. This is known as real-time system. In this phase, the business requirement about the summon management system also are gathered. In this phase also, the similar E-Saman System are studied and some improvement will be make to improve the current system. Analysis is also done to ensure who, when and where the system will be made for. Problem analysis and requirement analysis is also studied in depth in this phase. The project required two types of tools that are hardware and software.

1.5.3 Design

Design is an important phase in developing this system. There are several things that are designed in this phase. The first is the architecture design. This includes network infrastructure, hardware and software selection. In this project, network infrastructure for the summon management system is design. Next is the interface design that will determine how users will use the system. In this phase, the program will also be defined what program needs to be written and what each program do for the system.

1.5.4 Implementation

The implementation phase is the critical phase in developing the E-Saman system. It involves programming parts to develop the system, and a series of tests to ensure that system is works smoothly. The tests that will be conduct are student are develop the system and lecture. Once the system is working as intended and the test result are as expected, then the system is ready for use. The third project objective can be achieved after completed this phase.

1.5.5 Maintenance

The maintenance phase, it not included for this E-Saman system. For this system, not need to maintenance the system because it built for prototype.

1.6 Conclusion

In this chapter, it took more works on finding the fact on Internet and books according to the project development. Besides, the methodology for the project also has to be figure out because it is compulsory for developer to make sure the project run smoothly. Both hardware and software requirements should be defined in details to make work become easier. By make the specification according to the fact that has been searched, each developer will find out that the project become more efficient without any doubt.

CHAPTER 2

LITERATURE REVIEW

2.1 Overview

In this chapter, there will be seven subtopics that will cover from the definitions of the Mobile Applications for E-Saman System, existing mobile applications, and software requirements to develop the application.

Subtopic 2.2 will describe the definition and structure of E-Saman System. Subtopic 2.3 will define and discuss about Saman, while subtopic 2.4 will explain the concept of GSM system. Subtopic 2.5 will cover on the existing mobile applications for E-Saman system and discuss in detail on the specifications and functions of current applications that can be improved on this project. The last subtopic 2.6 will discuss in detail about the software requirements in developing the applications in this project.

Overall contents in this chapter will provide reader with the detail information of the method implementation that will be carried out in this project.

2.2 Saman System.

According to DBP, summon means warrant for the traffic offenses to come to the court for being discussed. The traffic citation is released by the authorities to the traffic offenses. Within summon, police and JPJ could avoid people from doing any traffic violation continuously. According to Dial-A-Law summons is a legal document issued by a court (a judicial summons) or by an administrative agency of government. A judicial summons is served on a person involved in a legal proceeding. Legal action may be in progress against the person, or the person's presence as witness may be required. In the former case, the summons will typically announce to the person to whom it is directed that a legal proceeding has been started against that person, and that a case has been initiated in the issuing court.

The definition of traffic offences as a crime is problematic. According Willett (1964), provided that both the definition of the law and criminal sociology. From a legal standpoint, though minor traffic offenses defined as crimes. In terms of sociology, criminal acts and offenses defined as involving deliberate intent, injury to person or property and dishonesty. Most traffic offenses are not included in this definition of criminal sociology. According Stylianou (2003), focused on the perceived consequences of crime as a dimension affecting perceived seriousness. Most traffic offenses are victimless crime without consequence and therefore not in a social consensus serious offenses shown by the current laws and enforcement budget. The main objective of the enforcement of traffic laws is to improve road safety. This is achieved by preventing motorists from proven guilty in connection with a road accident and injury (European Transport Safety Council (ETSC), 1999).

Based on the system, traffic summon is the main focuses in this project. According C.Mitchell (2011), Traffic laws are a nearly universal means of enforcing safety on roadways and among motorists. Breaking these laws usually result in a penalty. Penalties are generally assessed based on state information, and can carry a penalty of a nominal fine and a criminal court summons. Some jurisdictions will issue tickets for all offenses, the function is to assign blame and fix disputed penalty. Others instead will issue a traffic summons for the offense, forcing the recipient to appear in

court to have a sense of guilt or innocence is determined. Still others use both tickets and summonses, depending on the offense.

Quotes provided by the police on an almost constant in most places for offenses including speeding, illegal or manoeuvre reckless driving, and driving under the influence of alcohol or drugs. Unless the officer chose to let the driver off with a warning, he usually writes praise or ticket, explain the offense. Sometimes, the tickets are presented as a statement of wrongdoing, which assumes guilt and punishment fixed list. In other places, or under other circumstances, the ticket can be written in the form of summon.

According to John Allen (2010), traffic summons, sometimes called a speeding summons if speeding is an issue, identify the alleged offense, but require court appearances to prosecute innocent motorists and determine the appropriate sentence. Most of the times, there were only moving violation eligible for traffic summonses. Parking violations , damage to equipment such as lamps burned out , and any other traffic violations that do not involve actual driving ticket usually only be liable , not the date of the court. Tickets for violations of misconduct consider moving can almost always be challenged in court. The difference with traffic summons is a court appearance required. Typically, only a straight ticket recipient can choose to receive a charge, pay the fine, and move on. Receiver's summon had no choice.

A traffic citation is a summons issued by a law enforcement officer to the person who violated traffic laws. A traffic citation is known as a traffic ticket. This passage is a piece of paper that describes one or more violations that may have been done. When receiving traffic citations, the accused must appear before the court to pay the fine or contest the charge associated with the charge. A traffic citation may include one or more violations, depending on the violation made. Traffic citations may be issued for violations such as illegal lane changes, speeding, lack of insurance, no seat belt fastened, or a broken tail light.

2.2.1 Summon System of Malaysia's Road Transport Department

Malaysia's road transport department is (JPJ) the government agency responsible implementing rules of the road in Malaysia. Their responsibility is to make sure the roads in Malaysia are safe and road users to comply with the rules of the road that have been set. JPJ also is the agency that can issue summonses to road users if committing the offense. JPJ still using the current or manually system for their summon system. If have traffic offenses committed by road users, JPJ officer will ask for a driver's license and identification cards from traffic offenders. JPJ officer will record the offense committed in his offense or summons papers. In the summon papers will be recorded the following information:

i. Name
ii. IC
iii. Address
iv. No. of vehicle registration
v. No. trailer
vi. Types of vehicles
vii. Sections offense.
viii. Place
ix. Date
x. Hours
xi. Types of offenses committed

Traffic offenders will sign arrangements are in the summons and the JPJ will deliver the summon papers to the traffic offender. Information was recorded offenses will be manually entered into the computer by the JPJ officer. This information should be inserted into the computer and stored in the database. The process of entering data into the database would take a day or two. Data should be inserted into the database in order to facilitate traffic offenders check offenses have been committed by traffic offenders. Record of offenses will be deleted from the database after the payment is made.

Figure 2.1 shows the example of summon paper from JPJ officer. From this paper can see the details about summon. The summon paper have many form need to fill by JPJ officer.

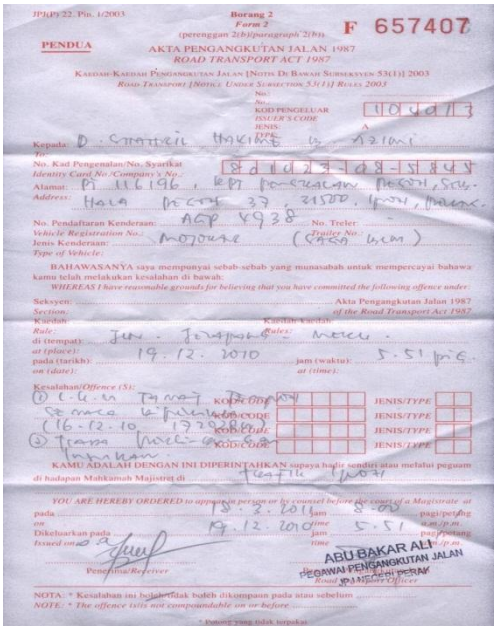

Figure 2.1: Example of summon paper from Malaysia's Road Transport Department

2.2.2 Summon System Majlis Pembandaran Kuantan

Majlis Pembandaran Kuantan (MPK) is a powerful agency in the district of Kuantan. MPK perform the tasks of which are make sure Kuantan in peace harmony and peace. MPK also ensure the vehicle around Kuantan placed in designated areas. For vehicles that are not parked in designated areas, MPK will issue a summons to the vehicle. There are two types of offenses will be summoned. The first offense is parking in an unauthorized and a second offense is not displaying parking coupons vehicle he front of the vehicle. (MPK) using a special tool to sue the vehicle. Tools can be used to summon the vehicle and issue the paper suit. Tools can also be used to check the temperature of the windscreen of the vehicle is parked know the how long vehicle parking. In the summon papers will be recorded the following information:

i. No vehicle
ii. Type of vehicle
iii. Vehicle Model

iv. Color
v. No offense box
vi. Name of the road
vii. Place of offense
viii. Date
ix. Time
x. Section and the particulars of the offense
xi. No coupon
xii. The amount of payment suit

For the amount of fine imposed is based today. If the fine is paid early the fines imposed are cheaper. There are three time payment set by the MPK.

i. Payment within 14 days
ii. Payment after 14 days
iii. Payment after 30 days before legal action

The data from traffic offenders were issued summonses will be fed into the database to facilitate the traffic offenders to check their summons. Data offenses will be deleted from the database after payment is made.

2.2.3 Summon System of Polis Traffic Diraja Malaysia

Traffic police is the government agency that ensures roads in Malaysia are safe and road users to comply with the rules of the road set. Police can issue summonses to traffic offenders if they commit traffic offenses. There are two types of offense summons issued by the police traffic Malaysia:

i. Notice of Summon POL 170A

Notices issued for offenses committed by vehicles without the presence of the driver or the offense committed by traffic offenders without detained by police as speed traps using LSD (Laser Speed Detected) or Laser Speed Trap and RLC (Red Light Camera) or camera Traffic Lights red.

ii. Summon POL. 257

Summons issued directly to traffic offenders when the offense is detected.

Figure 2.2 show examples of two pieces of summon paper from police traffic Malaysia. From this two summon paper can see the type of traffic offences and the details about summon paper. This paper will be given to traffic offenders.

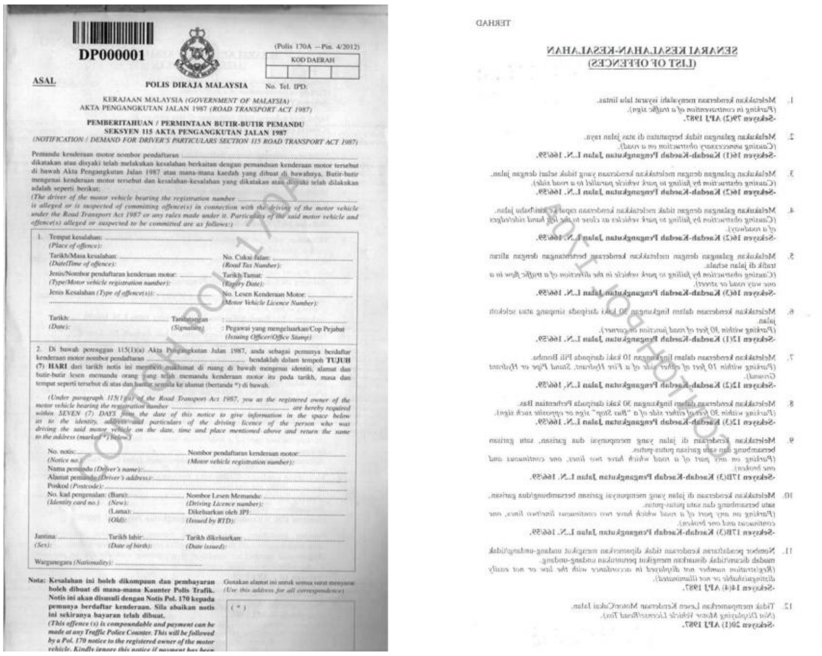

Figure 2.2: Example of paper summon from Polis traffic Diraja Malaysia

Figure 2.3 show the speed track camera used by police traffic Malaysia. Speed track summon is summoned applied to vehicles exceeding the speed limit on the road. Speed track camera is used to capture images of vehicles exceeding the speed limit. The camera will record the speed of vehicles exceeding the speed limit and record the data to summon the vehicle

Figure 2.3: Example of speed trap camera

Figure 2.4 shows the sample copy of summons letter, compound due to traffic offences. It is a piece of paper with two pages which contain two parts. First page is about the "Demand for driver's particulars Section 115 Road transport Act 1987 and the other second page is about "Offer to compound traffic offences". This summon notification letter should be delivered within one month after the summons is issued.

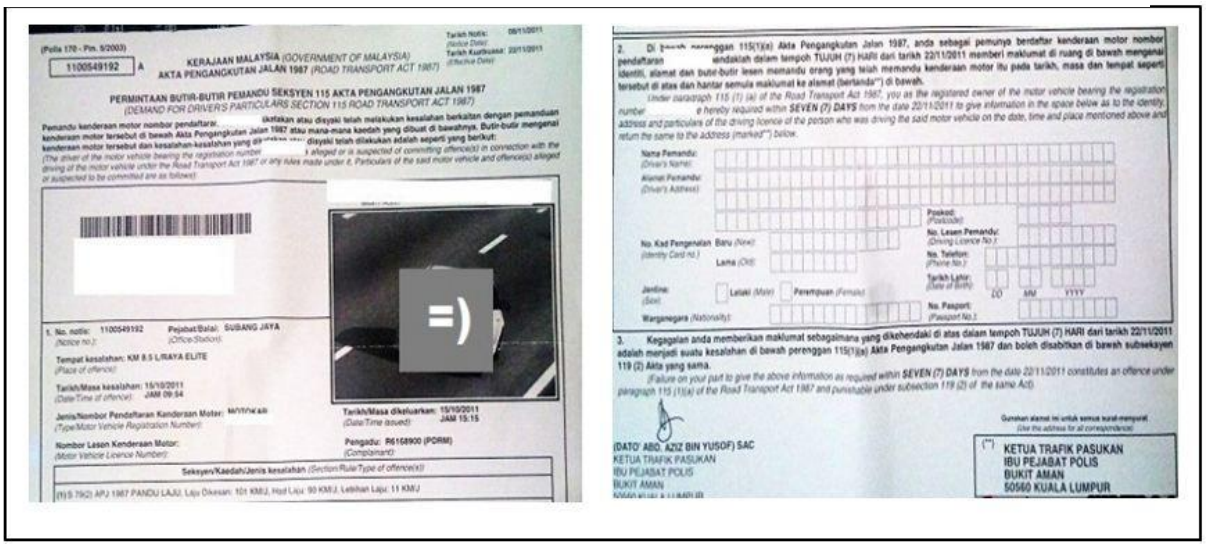

Figure 2.4: Sample copy of summons letter.

The first page states the detail of vehicle including photo captured by speed camera, details of owner and the traffic offences reported by PDRM officer. This part requires replying the details required which are details of the driver to Ketua traffic pasukan Ibu Pejabat Polis Bukit Aman within 7 days from the date given. The payment must be pay as soon as possible.

Table 2.1 show the comparison between three existing summons systems in Malaysia. For this project, three existing systems are selected to make a research. The research must have done to know the function and weakness for each existing system. From this table can see the function and the weakness for each summon system. Based on the research, the PDRM summon system is more function and they used new technology in summon system. For the JPJ summon system, they used the current system that like more to manually summon system. This system it not suitable for technology generation like now. For MPK they use the device to make summon and they used technology more high that JPJ and PDRM. After finished make research, many weaknesses are found in these three systems. E-Saman System is the solution for this problem. E-Saman System containing the mobile application, database application and GSM technology. The mobile system used for make summon and after that the data will automatically sent to database. At database, database will find the telephone number and sent the details of summon to offender through SMS of offender telephone. The offender will receive the details of summon as the remainder and they must make payment to delete the summon information.

Table 2.1: Comparison between existing Summon System in Malaysia**.**

Features supported	**Existing mobile application**	**JPJ**	**MPK**	**PDRM (Traffic)**
Manual system		√		√
Equipment System			√	√
Summon in front offender		√		√
Summon without offender			√	√
Personal Information		√		√
Database insert manually		√		√
Database insert automatically			√	√
Check summon online		√	√	√
Using summon paper		√	√	√
Need signature		√		√
Sent summon information		√		√
Online data access		√	√	√
Online payment		√	√	√

2.3 Saman System Architecture

2.3.1 GSM Technology.

Adam Fendelman (2002) stated that, GSM, which stands for Global System for Mobile communications, reigns as the world's most widely used cell phone technology. Mobile phones using the GSM cell phone service carriers to find the cell phone tower nearby. Groupe Special Mobile (GSM) was established by the European Conference of Postal and Telecommunications Administration (CEPT) for the design of mobile technology pan- European. In 1982 GSM was created by Groupe Special Mobile (GSM). The GSM Association is the group responsible for promoting industry trade organization of mobile phone carriers and manufacturers, estimates that 80 % of the global mobile market uses the standard.

SMS Gateway System Interface used GSM SMS service available with low-cost hardware equipment to create a system for remote monitoring and remote control. The system can be controlled and monitored through SMS from any GSM service. A device that connects to the system such as lighting for example, can turn on or off by sending SMS to the system (Smart Home System). The system also can turn the music on or off. The songs that will be played also be selected by the system via SMS (SMS Jukebox System). System status can be requested through SMS. This system can also be programmed to send SMS to a particular number set if any event or condition is triggered.

According to the GSM Association (GSMA), the new 1000 has registered every minute, when including both second-generation GSM, and also to the third generation 3GSM services. GSM system is a mobile communication system of the most popular that people choose to use. Naturally, this amazing growth is a result of its popularity in booming markets such as China, India, Africa and Latin America. Now the day has about 700 mobile networks provide GSM services in more than 200 countries. China, Russia, India and the United States are the country with the highest number of customers. GSM system is selected as a communication medium. The main reason to choose GSM system is the wide coverage of the system. GSM system is also use wireless system; it is an element of mobility. The system can be installed in areas

where wiring is not possible or to use / field temporary. Single system can. Serve multiple users at the same time without the need to add another set of tools such as Interactive Voice Response (IVR) system. SMS only have a few seconds to enter the system. Although IVR system to play sounds and wait for a response from the user with the connected phone

Telecommunication services can be divided into bearer services, teleservices, and supplementary services. The most basic teleservice supported by GSM is telephony (Gsmserver.com, 2010). Greeting us digitally encoded and transmitted through the GSM network as a digital stream. GSM users can send and receive data, at rates up to 9600 bps, to users on POTS (Plain Old Telephone Service), ISDN, Packet Switched Public Data Networks, and Circuit Switched Public Data Networks using a variety of access methods and protocols, such as X .25. X.25 protocol, adopted as a standard by the International Telegraph Consultative Committee and Telephone (CCITT), is commonly used network protocol. X.25 protocol allows computers on different public networks (such as CompuServe, Tymnet, or TCP / IP) to communicate through a computer intermediary layer of the network. X.25 Protocol's fit the data -link and physical layer protocol defined in the Open Systems Interconnection (OSI) communications model carefully.

A unique feature of GSM, not found in the old analog systems, is the Short Message Service (SMS). SMS is a bidirectional service for short alphanumeric (up to 160 bytes) messages. Messages are transported in a store and forward fashion. For point to point SMS, a message can be sent to other clients of the service, and acknowledgment is given to the sender. SMS can also be used in cell broadcast mode, for sending messages such as traffic updates or news. Messages can also be stored in the SIM card for later retrieval. Technically each SMS is only 140 x 8bit code. By using the GSM 03.38, a method that uses a lookup table to apply for 7-bit encoding for SMS-based text can increase the length of a character SMS to160. In addition to GSM also provides services for teleservices or bearer services. One of the advantages of working with GSM SMS is a low cost compared to SMS Answering dialling Interactive Voice (IVR) system. The longer the distance, the cost will rise to IVR. Here is a basic GSM services:

i. SMS

This service allows sending and receiving short messages (160 characters) to mobile phones. To use this service the user must have a GSM cell phone that supports sending and receiving short message service.

ii. Voice Mail

With voice mail users always reachable, even out of network coverage, if the discussion guide, if the user phone is disconnected or if the user does not want to receive calls. If in any of these cases a call, the call will be automatically forwarded to voice mail answering machine acting as a consumer and receive messages.

iii. Device of Charge

This service provides all the information needed to evaluate the traffic of each call. The customer can be informed of the charges, depending on the type of call and additional services used.

iv. Fax Message and Data Transmission

This service enables to transmit fax messages. Transmission is asynchronies with maximum speed of 9600 b/s. Cellular phone that supports this service, PCMCIA card (with appropriate software) compatible for cellular phone and laptop with PCMCIA connector. Or can use this service directly from the cellular phones that have built- n modems, so called communicators

v. Roaming

First of all, it depending on the existence of GSM cellular phone network in the country. Almost all European countries and the majority of countries in other continents of America, Asia, Africa and Australia have a range of GSM Cellular

phone compatible and enable international roaming. Possible to use international roaming depends on bilateral agreements between MobiMak and GSM cellular operator in the country. From the moment the new roaming contract and customers the opportunity to use these services in the partner network roaming have to pass certain tests, this is set by the international s standards GSM.

vi. Call Forwarding

If user already had a conversation or telephone is disconnected or for some reason and cannot receive calls for mobile telephone, can forward the call to any number of the fixed or mobile network which is entered in user mobile telephone.

vii. Call hold

If someone calls while the user is having a conversation, the user will receive a signal that sounds very useful when expecting some important calls.

viii. Call waiting

This function allows keeping the existing call and answering a second call

ix. Conference call

This service provides simultaneous conversations with five other customers.

x. Barring of incoming and outgoing calls

Can activate or deactivate the service from the mobile station with the possibility of sanctions all incoming or outgoing international calls or barring of all incoming or outgoing calls.

xi. Calling line ID Presentation

Sometimes it is good to know who is calling before answer. On the phone's display, calling party number is displayed. If so enter the number in the memory, the name that will appear. Each technology in this world must have for each technology type. This type of technology in differential needed each other. For GSM systems also have different types of systems. There are several types of GSM.

i. GSM 900:

•GSM 900 operates at 900MHz frequency.
•Up link operates on 890MHz to 915MHz Band.
•Down link operates on 935MHz to 960MHz Band.
•Uplink /Downlink separation: 45 MHz
•GSM takes advantages of both FDMA & TDMA.
•In 25MHz BW, 124 carriers are generated with channel spacing of 200 KHz (FDMA)
• Each carrier is divided into 8 time slots (TDMA)
• At any specific time 992 speech channels are made available in GSM 900.

ii. DCS 1800:

• DCS 1800 operates at 1800 MHz frequency
• Up link operates on 1715MHz to 1785MHz Band.
• Down link operates on 1805MHz to 1880MHz Band.
• Uplink /Downlink separation: 95 MHz
• Channel spacing: 200 kHz
• Each carrier is divided into 8 time slots (TDMA)

iii. PCS 1900:

- DCS 1900 operates at 1900 MHz frequency
- Up link operates on 1850 MHz to 1910MHz Band.
- Down link operates on 1930MHz to 1990MHz
- Uplink /Downlink separation: 80 MHz

Cricket Webber (2005) stated that, GSM, or Global System for Mobile communications, is one of several types of cellular technology. GSM allows voice and data transmission at some frequencies, and supports mobile devices from basic to smart phones. GSM provides compatibility, multitasking and speed advantages over CDMA 3G networks. GSM provides benefits and advantages to people and make people work more easily. Now day, GSM is the most important technology that people use in their lives. Here are the advantages of using GSM system.

GSM Advantages

i. It is a wireless system. So mobile equipment (cell phone) can be on move.
ii. High secrecy in the system. So information cannot be tapped easily.
iii. Easy to carry MS. And consumes less power.
iv. GSM provides more voice channels in limited bandwidth.
v. Cellular is based on concept of trunking. This allows large number of channels.

Figure 2.5 show the GSM network architecture. GSM network architecture can be divided into three main subsystems, the switching and management subsystem, base station systems, and operation and maintenance sub system. In addition, mobile stations can be seen as a separate sub system. It explains about step or flow for GSM system. GSM provides recommendations, not requirements. The GSM specifications define the functions and interface requirements in detail but do not address the hardware. The switching and management is carried by the subscriber. The Base Station Subsystem controls the radio link with the Mobile Station. The operation and maintenance subsystem, the main part of which is the Mobile services Switching Centre (MSC), performs the switching of calls between the mobile users, and between mobile and fixed network users. The MSC also handles the mobility management operations. Not shown is the Operations and Maintenance Centre, which oversees the proper operation and setup of the network. The Mobile Station and the Base Station Subsystem communicate across the Um interface, also known as the air interface or radio link. The Base Station Subsystem communicates with the Mobile services Switching Centre across the A interface.

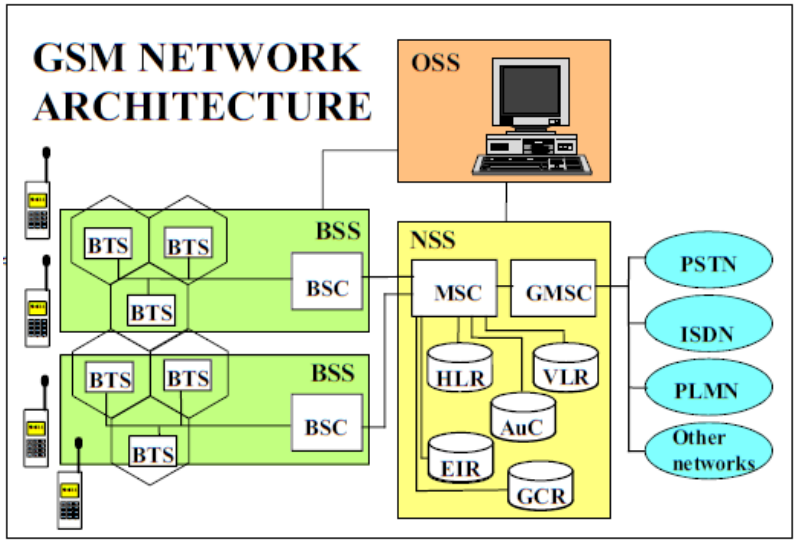

Figure 2.5: GSM network architecture

Figure 2.6 shows a TDMA multiplexing time division. Time-division multiplexing is an important fact that instead of having one transmitter connected to one receiver, there are multiple transmitters. In the case of the uplink from a mobile phone base station becomes difficult because the mobile phone can move around and vary the time required prior to the delivery address gaps in the delivery of its peers. The lowest level is the TDMA frame, which consists of breaking in 8 time slots. TDMA frame within a frame –based. The duration of the next stage in the traffic channel (120 ms) and the formed by 26 TDMA frames. Thus, the TDMA -frame is 120/26 = 4,615 ms. This gives the time slot 126 / (26 * 8) = 0.577 ms. Due to the time slot corresponding to 156.25 bits (including guard interval), this gives a bit rate of radio channel 156 * 25 * 26 * 8/120 = 270.833 Kbit / s.

The next level is the lowest multi-frame, which consists of 26 TDMA traffic channel frame and 51-frame TDMA control channel. As traffic channel is defined as a period of 120 ms, it follows that multiple frames in the control channel (51/26) * 120 = 235.4 ms. The following is the super frame , which contains 51 multi frames the traffic channel and multi- frame 26 in the control channel . Thus the period is 51 * 0.12 = 6,120 s in both traffic and control channels, and it consists of a 1326 - TDMA frame. In one super -frame all the logical channel is defined to be repeated at least once, or Super frame contains the entire logical channel structure. The highest level is a hyper - frame, which consists of 2048 super frames (2715648 TDMA - frame). The

period is 2048 * 6:12 = 12533.76 s = 3.4816 h. A hyper -frame contains the entire encryption sequence and frequency hopping sequence.

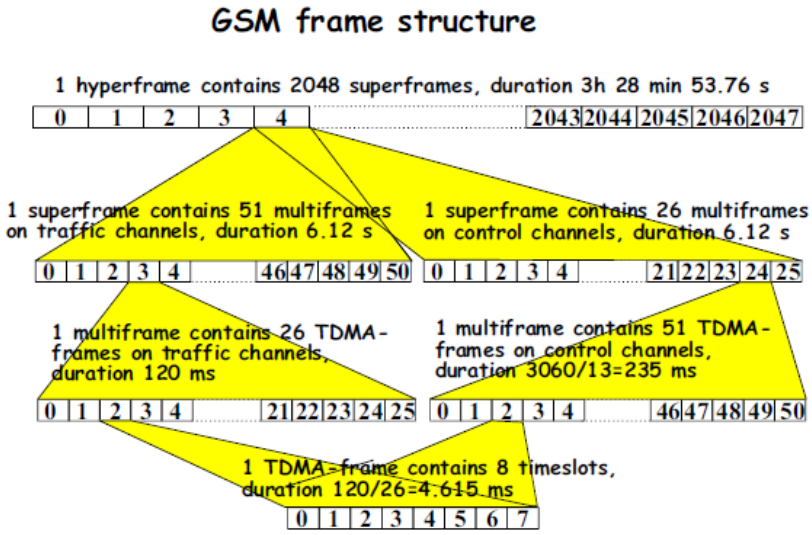

Figure 2.6: GSM network architecture

Table 2.2 shows the element of GSM network. The element of GSM can make excellent speech quality and extensive security features. In GSM element have three type of element are mobile station, base station subsystem and network subsystem. For the base station subsystem has two type is base transceiver station and base station controller.

Table 2.2: Element of GSM network

Mobile Station	Base Station Subsystem	Network Subsystem
• Mobile equipment (the terminal) • Smart card called the Subscriber Identity Module (SIM). • User can have access to subscribed services irrespective of a specific terminal. • Can make a call receive call • receive other subscribed services • SIM card contains the International Mobile Subscriber Identity (IMSI). • IMSI is to identify the subscriber to the system, secret key for authentication, and other. • SIM card may be protected against unauthorized use by a password or personal identity number.	**1)** Base Transceiver Station (BTS) • Radio transceivers that define a cell and handles the radio-link protocols with the Mobile Station • In a large urban area, potentially be a large number of BTS deployed • Requirements for BTS are ruggedness, reliability, portability, and minimum cost. **2)** Base Station Controller (BSC). • Handles radio-channel setup, frequency hopping, and handovers. • Connection between the mobile station and Mobile service Switching Center (MSC).	• Responsible for performing call processing subscriber-related functions. • Home location registers (HLR) - database used for storage and management of subscriptions. • Mobile services switching center (MSC) - performs the telephony switching functions of the system. Controls calls to and from other telephone and data systems. • Visitor location registers (VLR) - database that contains temporary information about subscribers that is needed by the MSC in order to service visiting subscribers. • Authentication center (AUC) - provides authentication and encryption parameters that verify the user's identity and ensure the confidentiality of each call. • Equipment identity register (EIR) - database that contains information about the identity of mobile equipment that prevents calls from stolen, unauthorized, or defective mobile stations.

Tables 2.3 show the advantages and disadvantages of GSM system. Before using GSM system, it is important to know the advantages and disadvantages of GSM system. From the advantages and disadvantages can know the weakness and strength of GSM system. GSM system is having more advantages that disadvantages. The advantages of GSM system can make it more useable and more function to user.

Table 2.3: Advantages and Disadvantages of GSM

Advantages	Disadvantages
1. Worldwide Roaming ➢ Obtainable in added than 200 countries, clienteles are capable to roam globally without altering their devices or their facility plans. **2. Security** ➢ Extremely protected, with skills in place that can defend against both snooping and service riding. ➢ SIM card or Subscriber recognize Unit card which transmits subscriber and exchange info, secures purchaser info. **3. Reasonable Devices and Facilities** ➢ Capable to deliver a huge diversity of reasonable devices and facilities. ➢ Numerous diverse kinds of devices for reasonable values since the huge capacity of purchases aid to energy down the trade costs. **4. Extensive Spectrums Obtainable** ➢ Usages five bands of MHz rate; 450, 850, 900, 1800 and 1900 MHz. ➢ Capable to yield devices that can choice up two or three diverse occurrence bands. ➢ GSM facility are effectual, data can transfer diagonally the frequency bands without dipping the efficiency of the signs.	**1. Released and Missed Calls** ➢ Conferring to Cellular Newscast, call superiority difficulties, with dropped calls and missed calls are shared difficulties with GSM expertise. ➢ Cannot provide accommodations as numerous callers on a lone cell tower as the more current CDMA technology. **2. Safety Issues** ➢ Hacker was capable to interrupt telephone calls from an amount of GSM-based cellular headphones. ➢ The tricky is founded right on the technology conferring to this hacker and the key was to "shot off" the GSM technology **3. Competence** ➢ Added tricky with GSM is a system problem somewhat than a customer problem, though it is a customer tricky for those who don't need to see a creation of cellular towers ➢ GSM technologies can knob rarer callers on a lone cellular tower.

2.3.2 Web Technology.

A web service is a web application or component which communicates with other applications using open protocols like HTTP (Hyper Text Transport Protocol), SOAP (Simple Object Access Protocol). Web services and consumers of Web services (clients) are typically businesses, making Web services predominantly business-to-business transactions. Web Services will always be accessed by software, never directly by humans even though there might be a human using that software. In simple words, websites for humans, Web Services for applications. Web services in easy term to understand are:

i. Application Programming Interfaces (API)

An API is a set of commands, functions, and protocols which programmers can use when developing software for a particular operating system. This API allows programmers to use the functions set to interact with the operating system, instead of writing from scratch.

All computer operating systems, like Windows, Unix, and Mac OS, providing an application program interface for programmers. API is also used by video game consoles and other hardware devices running software programs.

ii. Request services

Request services are process to send and received for the process or services. This service important in web servicers because it make web services more function and can request for the process.

iii. REST architecture

Style of software architecture that consists of a coordinated set of architectural constraints applied to components, connectors, and data elements in a distributed hypermedia system. REST ignores the details of component implementation and protocol syntax to focus on the role of components, restrictions on their interaction with other components, and their interpretation of the data elements are important

iv. SOA architecture

It is the underlying structure supporting communications between services. SOA defines how two computing entities, such as programs, interact in such a way to enable one entity to perform a unit of work on behalf of another entity. Interactions are defined using a description language services. Each interaction is self-contained and loosely coupled, so that each interaction is independent of any other interaction.

v. World Wide Web Consortium (W3C)

W3C's mission is to lead the Web to its full potential by developing protocols and guidelines. This is achieved mainly by creating and publishing web standards. With the adoption of web standards created by the W3C, hardware manufacturers and software developers can make their equipment and work programs with the latest Web technologies.

The function of the web services are:

i. The client sends a request
ii. Request encoded in XML
iii. Function (GET, POST…) in the file
iv. The server decodes the file
v. The function is executed
vi. A new XML file is encoded and re-send to the client

Clients and servers communicate over the Hypertext Transfer Protocol (HTTP). World Wide Web Consortium (W3C) need signature as confirmation of traffic offenders. Figure 2.7 show the flow diagram is self-explanatory of how the process and flow of each call is in a web service.

i. Discovery - Search UDDI site(s) for the proper Web service.
ii. Description - A description of the selected Web service is returned to the client application as a Web Services Description Language (WSDL) file.

iii. Proxy creation - A local proxy to the remote service is created. The proxy converts an object's means of method invocation into an XML message, and vice versa.

iv. Soap Message Creation - a Soap/XML message is created and sent to the URL specified in the WSDL file.

v. Listener - A Soap listener at the host site receives the call and interprets it for the Web Service.

vi. The Web service performs its function, and returns the result back to the client, via the listener and the proxy.

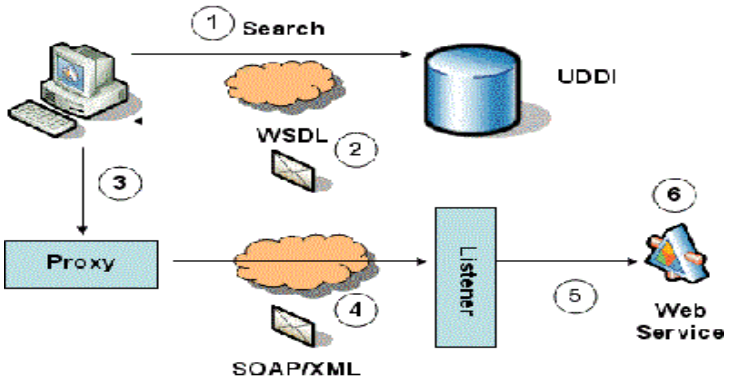

Figure 2.7: The process flow of a Web Service

Each web service has a public interface, WSDL (Web Services Description Language), and through a simple mechanism called UDDI (Universal Description, Discover and Integration) a directory service, WSDL publishing and register there and interested parties can find a public interface to use through UDDI. There is a soap xml based protocol to let applications exchange info formation via http with a very simple way in which the UDDI and WSDL are web services words to describe what they do and SOAP (Simple Object Access Protocol) talks to them.

Figure 2.8 show the example process of web services. An example of a Web service is that of a stock quote service, in which the client requests for the current price of a specified stock by sending an XML SOAP message containing the request

(probably a stock symbol for a company), and the web service responds with a corresponding XML SOAP response message containing the stock price.

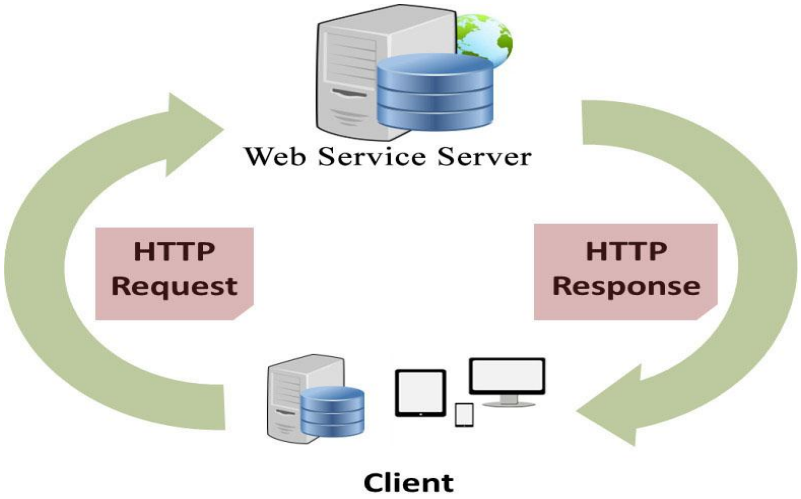

Figure 2.8: Process of web services

Figure 2.9 show the web services roles, operations and artefacts. Web service architecture is based on the interactions between three roles is service provider, service registry and service requestor. Interactions involve publish, find and bind operations. Together the roles and operations act upon the web service artefacts, software modules and web services description. In a typical scenario a service provider hosts a network accessible software module (an implementation of Web services). The service provider defines a service description for the web service and publishes it to a service requestor or service registry. The traffic operation services using find to get the service description locally or from registry services and use service description to bind with the service provider and invoke interact with web services implementation. Service provider and service requestor roles are logical construct and services that can exhibit these both characteristics.

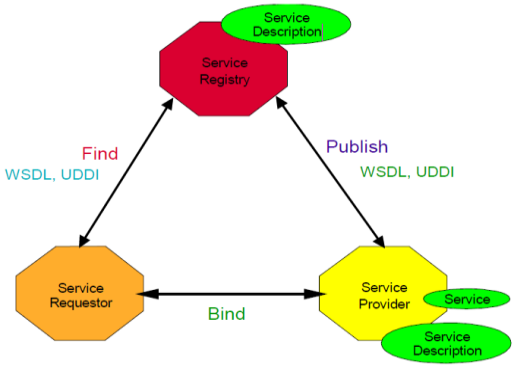

Figure 2.9: Web services roles, operations and artefacts.

Roles in web services architecture

i. Service providers from a business perspective, this is the service owner. Architectural perspective, this is the platform that hosts access to the service.

ii. Service requestor from a business perspective, this is a business that requires certain functions to be satisfied. From the architectural perspective, this is the application is looking for and applying for or initiate interaction with the service. The service requestor role can be played by a browser driven by a person or a program without a user interface, for example another Web service.

iii. Registration services this is a searchable registry of service descriptions where service providers publish their service descriptions. Service Requestors find services and obtain binding information for services during development for binding or during execution for dynamic binding of static. For statically bound service requestors, the service registry role in the architecture of choice, because the service Information providers can send directly to service requestors. Similarly, service requestors can obtain service information from sources other than the service registration, such as local files, FTP sites, web sites, ads and Discovery Services (ADS) or Discovery of Web Services (DISCO).

The advantages of web services

i. Web Services are language and platform independent and provide interoperability due to use of open standards and protocols.

ii. Web Services are more adequate for loosely coupled systems where the client might have no prior knowledge of the Web Service until it actually invokes it.

iii. Interoperability - This is the most important benefit of Web Services. Web services usually work outside the private network, which offers developers access to non-proprietary solutions. Services are developed may, therefore, have a longer life, which offers a better return on investment to advanced services. Web Services also allows developers to use the programming language of their choice.

iv. Usability – Web Services allow the business logic of many different systems to be exposed over the Web making it easier for any client application built using any technology to access web services.

V. Reusability - Web Services does not provide a component-based application development model, but the closest thing possible to zero-coding deployment of these services. This makes it easy to reuse Web Service components as appropriate in other services. It also makes it easier to use legacy code as Web services.

VI. Open Standards – Web Services are deployed over standard Internet technologies. This makes it possible to deploy Web Services even over firewall to servers running on the Internet on the other side of the globe. This standardization of protocol stack gives businesses many advantages like wide range of choices, reduction in the cost due to competition and increase in the quality.

2.3.3 Mobile Technology.

Shuaib (2011) stated that, mobile technology is the technologies platforms that are developed for and used on mobile devices. It can develop mobile technology on mobile technology on a computer or mobile device to create another mobile technology. For instance WAP is a mobile technology and so are SMS and mobile applications or mobile websites and etc**.** Mobile technology is exactly what the name implies a mobile technology. It is used as a communications technology using transmission media such as radio waves, microwaves and Bluetooth so that we can transfer any type of data with mobile technology such as voice, video, text, etc.

Mobile technology is the technology used for cellular communication. Code division multiple access mobile (CDMA) technology has evolved rapidly over the past few years. Since the start of this millennium , a standard mobile device has gone from being no more than a simple two-way pager to being a mobile phone , GPS navigation device , web browser and instant messaging client embedded , and handheld game consoles . Many experts argue that the future of computer technology is in mobile computing and wireless networks. Mobile computing through tablet computers becomes more popular.

According to Anita Rosen (2010), the device of mobile technology is a combination of hardware, operating systems, networks and software. Hardware includes a PDA, like a Palm Pilot or Handspring, mobile phones and video game players. The examples of application program such as phonebook and calendar program. At present, many operating systems compete to leave the market without a market leader. Network is the infrastructure that supports the transfer of information. Mobile networks are to your local cell technology. Mobile technology is among the most widely used technology in use today. It consists of all forms of mobile technology, such as mobile phones, laptops, palmtops or personal digital assistants (PDAs), global positioning system (GPS) and wireless card payment terminals.

Technology move various benefits type that are given a wide and advantage to the Consumers, on a person namely no longer imprisoned in a particular place to respective business, for these Transactions can be done while on road. Technology move also allows faster communication, check availability and flexibility work orders in real time. Benefit of mobile technology are unlike last time when document or

important records need to be sent or relay from house to house, with technology move them can be sent and relay in few minutes. These documents could be sent soft copy by using PDF files and enclosed in sender e-mail address and become sent to recipient. That same go away talking with others cross world; they now can be reached by use talk and video call over Internet. The mobile technologies also have Wi-Fi systems. Wi-Fi systems as they are called, is the wireless local area network technology, and they are now available in a variety of places, such as coffee shops, parks and other organizations. Via a laptop or PDA console, one can conduct business and connect to the Internet even while on the outside, as long as the Wi-Fi signal is present.

According to Anya Meave (2010), Mobile technology is changing the way the world completes tasks. Movies can be viewed while riding public transportation on cellular phones and books can be read, without an actual book, on reading devices. Many types of technology exists permitting users to connect with each other wirelessly. Understanding the newest devices is only half the battle, as the next piece of technology is aimed at being better than the last. The mobile technology has different of type;

i. Mobile phone technology

Mobile phones, also known as a mobile phone, are a mobile version of a land line telephone. Mobile phone works by sending radio signals detected by a cell tower which then connects to the local telephone network and remotely. This cell towers placed around the world and enable people to connect with others without using a cable land. Mobile phone users have the ability to communicate with others via voice, short message service (SMS), also known as text messaging, and via the Internet without wires. Users can also take pictures and record videos with mobile phones, which can all be transmitted to others

ii. Mobile tablet PC

A portable tablet personal computer (PC) works much like a portable computer, known as a laptop, but in the absence of a physical keyboard. Users can operate the tablet PC with touch keys on the virtual keyboard on the screen with a finger or stylus pen. Tablet PC can connect to the Internet wirelessly with built-in adapter, if serviced by wireless internet providers

iii. Mobile reading devices

Mobile reading devices is also known as eBook reader, allowing users to read digital books. Portable reading devices use page graphic that resembles a real book which can be changed with the touch of a finger or stylus. Thousands of titles are available digitally can be downloaded into the device via the web reading service providers once purchased. Consumers are not limited to books, as online versions of newspapers and magazines can also be downloaded.

Figure 2.10 shows the rich client mobile application architecture with components grouped by areas of concern. A mobile application will normally be structured as a multi-layered application consisting of presentation, business and data layers. When developing mobile applications, you can choose to develop a web-based thin client or rich client. If you want to build a rich client, business and data layers may be located on the device itself. If you want to build a thin client, all layers will be located on the server.

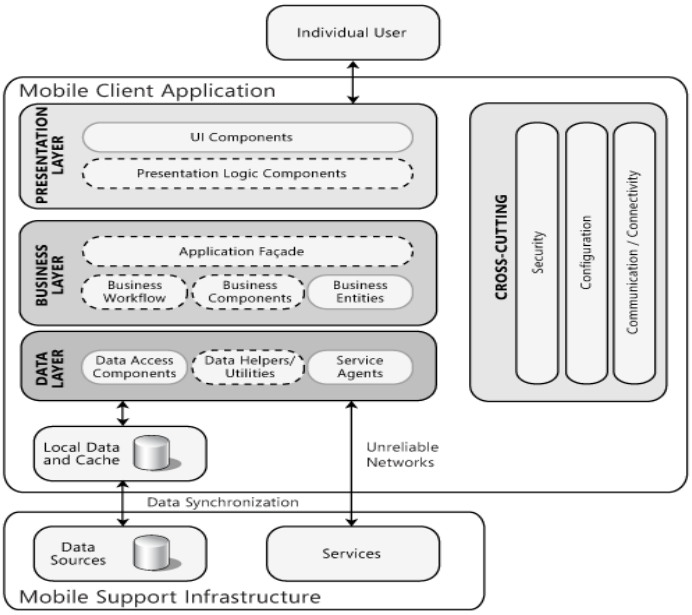

Figure 2.10: Common mobile application architecture

A mobile application generally contains the user interface components in the presentation layer, and could include presentation logic components. Business layer, if it exists, will usually contain business logic components, any business workflow and business entity components required by the application, and, optionally, a façade. Data layer will typically include data access and service agent components. In order to reduce the footprint on devices, mobile applications are generally less rigid layer approach and fewer discrete components.

i. Presentation Layer Components

- **User interface (UI) components**. User interface components provide a way for users to interact with the application. They render and format data for users. They also acquire and validate data input by the user.
- **User process components**. User process components synchronize and orchestrate user interactions. Separate user process components may be useful if have a complicated UI. Implementing common user interaction patterns as separate user process components allows you to reuse them in multiple UIs.

ii. Key Business Components

- **Application façade** (optional). An application façade combines multiple business operations into a single message-based operation.
- **Business components**. Within the business layer there are different components that provide business services, such as processing business rules and interacting with data access components.
- **Business entities**. Business components used to pass data between other components are considered business entities. The data can represent real-world business entities, such as products and orders, or database entities, such as tables and views.
- **Business workflows**. Many business processes involve multiple steps that must be performed in the correct order and orchestrated.

iii. Data Access Layer Guidelines

- **Data access logic components**. Data access components abstract the logic necessary to access your underlying data stores. Doing so centralizes the data access functionality, which makes the application easier to configure and maintain.
- **Data helpers / utilities**. Helper functions and utilities assist in data manipulation, data transformation, and data access within the layer.
- **Service agents**. When a business component must use functionality exposed by an external service.

iv. Service Layer Guidelines

- **Service interfaces**. Services expose a service interface to which all inbound messages are sent. The definition of the set of messages that must be exchanged with a service, in order for the service to perform a specific business task, constitutes a contract.
- **Message types**. When exchanging data across the service layer, data structures are wrapped by message structures that support different types of operations.

2.4 Hardware and Software

2.4.1 Hardware Specification

Hardware is important device to complete this system. The hardware are important to communicate with software. In this system, it no involves many of hardware. It just involves GSM technology for this E-Saman system. The term is used for GSM900 GSM system operating in any 900 MHz 900 MHz band is defined in the ETSI standard includes major band GSM (GSM-R), an extension and part of the 900 MHz band designated for trains (R-GSM). Amount defined in the standard GSM900 band between 876-915 MHz paired with 921-960 MHz Mobiles shipping in the lower band and base stations transmit in the band.

It is also known as Personal Communications Network (PCN). Version up banded GSM digital cellular radio system of pan-European. DCS 1800 operates at 1800 MHz (1.8 GHz) range, rather than a range of 900 MHz GSM network. DCS band is 1710- 1785 MHz and 1805-1880 MHz there is at least five licensed sub-bands within the range of that in the majority of countries that have DCS. In the context of WCDMA and LTE networks, also known as DCS band 3 (III).

Table 2.4 shows the comparison hardware of GSM technology. From this table can see the different between GSM900, DCS 1800 and PCS 1900. GSM 900 is more usable from other GSM technology. The GSM 900 is used FDMA & TDMA technology. GSM 900 is suitable used at all country in the world. The GSM 900 combines superior performance of GSM with coverage benefits of 900MHz spectrums. GSM 900 provides excellent coverage in rural areas GSM 900 improves indoor coverage and augments capacity in urban areas. GSM - signal bandwidth is larger than the other systems. When propagation delay high bandwidth, the need for channel equalization is high, on the other hand very deep fading will be less likely. All coding systems use voice, channel coding and interleaving code. In GSM, constant envelope, continuous phase modulation used. In other TDMA systems is shifted DQPSK modulation method, containing variations of the envelope. Thus this system put higher requirements on the transmitter power amplifier linearity of GSM. in Binary PSK CDMA system is easy to use .

Table 2.4: Comparison between different digital cellular

Features supported	**GSM**	**GSM900 GSM1800 GSM1900**	**D-AMPS IS-54**	**CDMA800 IS-95**	**PDC900 PDC1500**
Frequencies (MHz)		890-915@900 935-960 1710-1785 @ 1805-1880 1800	824-849 869-894	824-849 869-894	810-830 940-960 1429-1453 1477-1501
Duplex spacing		45 MHz 95 MHz	45 MHz	45 MHz	130 MHz@800 48 MHz@1500
Carrier spacing		200 kHz	30 kHz	1.25 MHz	25 kHz
Multiple access		TDMA/ FDMA	TDMA/ FDMA	CDMA	TDMA/ FDMA
Voice coding		RPE-LTP 13/6.5 Kbit/s	VSELP 7.95 Kbit/s	QSELP 9.6/13.4 Kbit/s	VSELP 6.7 Kbit/s
Time slots/ carrier		8	3	-	3
Coded signal rate		22.8 Kbit/s	13 Kbit/s	19.2 Kbit/s UL 28.8 Kbit/s DL	6.7 Kbit/s
Interleaving		40 ms	2 bursts	20 ms	
Burst duration		0.577 ms	6.67 ms	-	6.67 ms
Radio channel rate		270.833 Kbit/s	48.6 Kbit/s	1.2288 Mchip/s	42 Kbit/s
Modulation		GMSK BT=0.3	1/4-shifted DQPSK	4QAM	1/4-shifted DQPSK

2.4.2 Software Specification

A database is a collection of information that is organized so that it can easily be accessed, managed, and updated. In one view, database can be classified according type of content bibliographic, full-text, numeric and images. According Cory Jonson (2002), database software is a program or utility software used to create, edit and maintain files and records in the database. This type of software allows users to store data in a structured form fields, tables, and columns, queen then be taken directly or through the access plan. Database software is also known as database management software (DBMS), although the exact terms are not synonymous. Database software is primarily used to store and manage data / databases, usually in a structured format. It usually provides a graphical interface that allows users to create, edit and manage data fields and records in tables or organized. Data / database saved using this software can be found in raw format, or the report based format.

2.4.2.1 Javascript

For the GSM technology, the programming language that can be used is javascript. JavaScript is a very simple scripting language that used in web browser to make websites more dynamic. JavaScript is use together with HTML. HTML is more or less static pages. When user loads the page, the view of the page would not be change much until user click a link which will lead to another page. By adding JavaScript code, it would allow to change the look of document completely. It could change the text, color, change the options that available in a drop down list and so forth.

JavaScript is a client-side language. All the action occurs on the client‟s side of things. It means that, there will be no trips or transaction to the server required for any operation. The trips to server will only slow down the process and cause increase the processing time. Therefore, the code of JavaScript will help to reduce the process time and performed its job instantaneously. The example of the operation is request input validation. This task will speeds up the process.

2.4.2.2 Database

A database is an application that manages data and allows fast storage and also retrieval of data. Database is actually a collection of information that is organized so that it could be managed, accessed and updated easily. Database can be classified according to the types of their contents such as bibliographic, document-text, numeric and images. Digital databases are managed using database management systems which store the databases contents allowing data creation, maintenance, search and other access like mentioned earlier on.

A very basic form of database is a spreadsheet. Spreadsheet allows user to catalog information easily. However, user need database management in order to find the relationship in the data on the spreadsheet. Example of spreadsheet is Microsoft Excel. Same as Microsoft Excel tables, database consists of columns and rows. Each column contains different types of attributes and each row corresponds to a single record. Besides that, database can go beyond that. It could allow user to access information in new ways and apply the information in different formats such as Web pages.

2.4.2.3 MySQL Database

MySQL database is a database of web hosting that is used to store information websites such as blog entries for information. Databases MySQL is the most popular relational database on the web today. This is partly because it is free but also very strong. MySQL is a relational database management system (RDBMS) based on SQL. It was released in January 1998. Many Internet start-ups became interested in the original open source version of MySQL as an alternative to the proprietary database systems from Oracle, IBM, and Informix. MySQL runs on virtually all platforms, including Linux, UNIX, and Windows. It is fully multi-threaded using kernel threads and provides application program interfaces (APIs) for many programming languages such as C, C++l, Java, PHP and Python. MySQL is open source database that is widely used. MySQL is a database backend most websites. Advantages of MySQL are an open source database system. MySQL is strong and it provides excellent performance. MySQL occupies very less disk

space and can be easily installed on all major operating systems such as Microsoft Windows and Linux UNIX.

2.4.2.4 PHP Database

PHP Hypertext Preprocessor allows web developers to create dynamic content that interacts with databases. PHP applications are usually found in conjunction with the Linux server and MySQL database. It provides them with the server functions are accorded to the Windows platform by Active Server Pages technologist. PhpMyAdmin is a useful program to perform maintenance operations on the table, make a backup of the information, and editing things directly if does not work. Although many of the same task scan be performed on the MySQL command line, doing so is not an option for many people. The advantages of PHP is PHP is an open source, open source is one in which consumers are given free license to remodel or recode PHP, according to their needs. The source code shipped with PHP. PHP supports multiple platforms, which means PHP can be installed on almost every operating system, such as window-x, Linux, and other users can select the appropriate version and follow the instructions given in the manual accordingly.

2.4.2.5 Oracle Database

Oracle database (Oracle DB) is a relational database management system (RDBMS) from Oracle Corporation. Originally developed in 1977 by Lawrence Ellison and other developers, Oracle DB is one of the relational database engine that is the most reliable and widely used. The system is built around the framework of a relational database in which data objects can be accessed directly by the user (or the front end of the application) through structured query language (SQL). Oracle is a relational database architecture is fully scalable and often used by global enterprises, to manage and process data across local and wide area networks. Oracle database has its own network components to enable communication across a network. One advantage of the Oracle database is that it offers the ability to use a centralized management system. Another advantage of

standardization and consistency so proficient technicians can fix any problems that occur.

2.4.2.6 WampServer Database

Stands for "Windows, Apache, MySQL, and PHP." Variations from LAMP to WAMP Windows systems and are often installed as a bundle of software (Apache, MySQL, and PHP). It is often used for web development and internal testing, but can also be used to serve web pages directly. The most important part of WAMP packages are used Apache web server run in Windows. By running a local Apache web server on a Windows machine, web developers can test Web page in a Web browser without publishing them directly on the Internet.

WampServer also includes MySQL and PHP, which are the two most common technologies used to create dynamic websites. MySQL is a database of high-speed, while PHP is a scripting language that can be used to access data from the database. By installing the two components in the country, developers can build and test a dynamic site before publishing to the public web server.

2.4.2.7 DB2 Database

DB2 is a family relationship database management system (RDBMS) product from IBM that serves a number of different operating system platforms. According to IBM, DB2 leads in terms of database market share and performance. Although DB2 product offered for UNIX-based systems and personal computer operating systems, the DB2 database product trails Oracle in UNIX-based systems and Microsoft Access in Windows system.

The name refers to the shift from hierarchical database model which then spread to a new relationship model. While DB2 was initially designed to work exclusively on the IBM mainframe platform, it is then transferred to another operating system that is widely used as UNIX, Windows and now in Linux. DB2 is part of IBM's information management portfolio. It is, high-performance database engine capable of handling complete large quantities of data and simultaneously serve many users.

Table 2.5 shows the comparison between different database software. The comparison between software is important to know the weakness and strength of each softwares. For this E-Saman System, three types of softwares are decided to make a research is JavaScript, PHP and MySQL. Before deciding software that will be used, the first things that must to know are the features and functions for each softwares. The features and functions must be suitable with the system want to build. The E-Saman System is system that use database systems as place to store that summon information. The data from database will be sent to offender using GSM system.

Table 2.5: Comparison between different database software

Features supported	**IDE**	**JavaScript**	**PHP**	**MySQL**
Supported languages		Java,Ada,ABAP, C,C++, COBOL, Fortran, Haskell, JavaScript, Lasso, Natural,Perl, PHP, Python,R, Ruby (including Ruby on Rails framework),Scala, Clojure,Groovy, Scheme,Erlang	Java,PHP,C/C++, HTML5, HTML/XHTML/CSS, XML/XSL, ActionScript/MXML, Python, Ruby/JRuby, Groovy, SQL.	Java,JavaFX, JavaScript, CoffeeScript, HTML/XHTML/CSS, XML/XSL, ActionScript/MXML, Python, Ruby/JRuby, Groovy, SQL. PHP,Scala,Clojure, Dart,Haxe,Kotlin, TypoScript,Jelastic (via seperate plugin).
Supported technologies and frameworks		Equinox OSGi, Standard Widget Toolkit,JFace.	Apache Struts 2, Wicket,ICEfaces 2.0, Struts,Struts 2,JBoss	JSP,JSF,EJB,Ajax, Google Web Toolkit, Struts,Struts 2,JBoss

		Seam, Spring, Hibernate/JPA,Web Services,Ruby on Rails, Grails (framework),Java,ME MIDP/CLDC,OSGi,Android, Tapestry, Google App Engine,FreeMarker,Velocity, Django,Play.	Seam, Spring, Hibernate/JPA,Web Services,Ruby on Rails, Grails (framework),Java,ME MIDP/CLDC,OSGi, Android, Tapestry, Google App Engine,FreeMarker, Velocity, Django,Play.
Supported application servers	Tomcat,GlassFish.	GlassFish,Tomcat.	GlassFish,JBoss,Tomcat, Jetty,WebLogic, WebSphere, Geronimo

Figure 2.6 shows the comparison between difference application servers. Three application servers that have been researched are DB2, WampServer and Oracle. Each application server has their own weakness and strength. Each application server must be researched in all aspect to get the details result. This application server is used for place for database software. Database software runs in application server.

Table 2.6: Comparison between different application servers

Name	DB2	WampServer	Oracle
Description	Common in IBM host environments, 2 different versions for host and Windows/Linux	Widely used open source RDBMS	Widely used RDBMS
DB-Engines Ranking	Rank : 6 Score: 186.47	Rank : 14 Score: 55.59	Rank : 1 Score: 1502.74
Developer	IBM	Oracle	Oracle
Initial release	1983	1995	1980
License	Open Source/ commercial	Open Source/ commercial	Commercial
Implementation language	C and C++	C and C++	C and C++
Server operating systems	Linux Unix Windows z/OS	FreeBSD Linux OS X Solaris Windows	AIX HP-UX Linux OS X Solaris Windows z/OS
Database model	Relational DBMS	Relational DBMS	Relational DBMS
Data scheme	yes	yes	yes
Typing	yes	yes	yes
Secondary indexes	yes	yes	yes
SQL	yes	yes	yes
APIs and other access methods	JSON style queries	ADO.NET JDBC	ODP.NET Oracle Call

	XQuery ADO.NET JDBC ODBC	ODBC	Interface (OCI) JDBC ODBC
Supported programming languages	C C# C++ Cobol Fortran Java Perl PHP Python Ruby Visual Basic	Ada C C# C++ D Eiffel Erlang Haskell Java Objective-C OCaml Perl PHP Python Ruby	C C# C++ Clojure Cobol Eiffel Erlang Fortran Groovy Haskell Java JavaScript Lisp Objective C OCaml Perl PHP Python R Ruby Scala Tcl Visual Basic
Server-side scripts	yes	yes	PL/SQL

2.5 Conclusion

For the conclusion, this chapter have three subtopics which are summon system, summon system architecture and hardware and software requirement. For this all three subtopic need load of research to get the details information about this chapter. The research is needed to make to get information before can the next step for this system. Before developing the new system, need to know the existing system. From existing system can make the new system better that existing system. For subtopic summon system, need to explain and describe details about summon systems. In this subtopic, all about summon need to explain and must have fact for each explanations. In this subtopic also needs to explain about existing system of summon system in Malaysia. Three existing summon systems that were chosen to research and explain are summoning system of Malaysia Road Transport Department, summon system of Majlis Pembandaran Kuantan and summon system of Polis Traffic Diraja Malaysia. These three existing systems are the most popular summon systems in Malaysia. After make research between these three existing summon systems, the comparisons between these three summon systems is needed because from comparison the different function, technology, way to make summon and how each system communicate each other can be obtained. From the comparison can decide the best solution for each problem at existing system.

Next subtopic is summoning system architectures. In this subtopic, need to explain and describe clearly about the architecture for each technology that is chosen to be used. For this subtopic there are three small subtopics under subtopic summon system architecture are GSM technology, web technology and mobile technology. GSM technology is technology that used to send the information from server to user using GSM system GSM modem. This GSM system used because it can make user easy to know the details about summon. Using this GSM system is the easy way to communicate with traffic offender. For the web technology is used for medium communicate between GSM system and user. The web technology is also known as a place for database to store the information. Web technology is important in this system because it can make this system look more systematic and easy to manage the data of summons. The mobile technology is the device or technology that used in this E-Saman System. Mobile technology is important because mobile is the main function in this E-Saman System. The E-Saman System is system that main function

using mobile. In this subtopic, mobile architecture need to explain and know function for each architecture. The architecture is important because from the architecture it easier to knows the step or flow each system.

The last subtopic is hardware and software speciation. The hardware and software speciation are the devices and the software that are needed in this system. Hardware and software are equipment that makes the system completed. To develop the E-Saman System, hardware and software are the important elements to identifier because from hardware and software can make the perfect system. Many hardware and software need to be identified because there are a lot of free source of software in internet. Some hardware involved in this E-Saman System is mobile MyCard reader and GSM Modem. The best hardware are needed to find because to know the function, price and capability of hardware. This chapter discusses more about the literature review of existing system and the future system. From this chapter can define the scope and requirements and speciation of E- Saman System. It is important to make sure this system developed based on the architecture and flow of the development.

CHAPTER 3

PROPOSED WORK

3.1 Overview

In this chapter, there will be seven subtopics that will cover from the complete context diagram for E-Saman System, logical diagram, data dictionary and hardware and software requirements to develop the E-Saman System.

Subtopic 3.2 will describes the complete context diagrams of E-Saman System. Subtopic 3.3 will define and discuss about E-Saman System in admin side, while subtopic 3.4 will explain the logical diagram of E-Saman System. Subtopic 3.5 will cover on the data dictionary of database. The last subtopic 3.6 will discuss in detail about the database design for E-Saman System. Subtopic 3.7 will be explained about hardware requirement and the function. Subtopic 3.8 will be explained about software requirement and the function.

Overall contents in this chapter will provide reader with the detail information of the method implementation that will be carried out in this project.

3.2 Context Diagram

This chapter presents the proposed framework for E-Saman system. The first section will discusses about the aim why use this system and how it work. Then tell about flow process of this system figure

Figure 3.1 show the complete process of E-Saman system the general. Firstly, the UMP security officer fined the traffic offender from staff or student. After found the offender, the UMP security officers ask them the IC card. The IC card will scan at IC scanner to get the personal information. The personal information is important because it will save in database until make a payment. The data from IC card will be transfer into device. After finish transfer the information from IC card, UMP security officer will ask some information to make details of summon. The internet connection is important to send the data into database server. If there is no internet connection, data will be saved into micro SD card. Data from micro SD card must be transfer manually after UMP security officer back to office.

Secondly, after all data transfer or sent into database server, they will sent the data to GSM server or modem. Before used the GSM modem, the database server must find the correct phone number because GSM modem sent the information using phone number. After that, GSM system will process the data and details from server. The GSM modem sent the details into offender phone. The offender will receive the details about summon from GSM system. Data of offender deleted from database after make a payment.

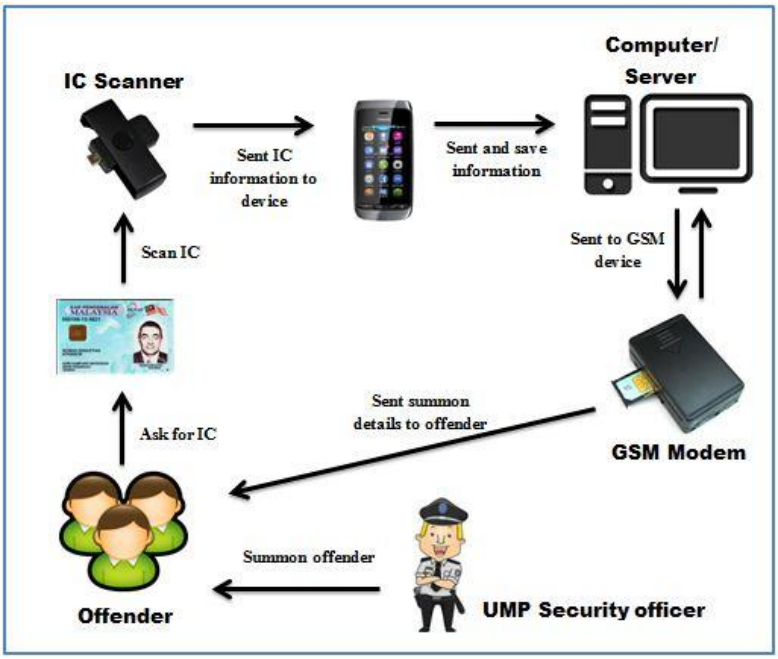

Figure 3.1: Complete context diagram of E-Saman system

3.3 E-Saman System.

For this E-Saman System, the system that is developed is for admin side. The admin side is place for admin managed and monitors the database and GSM system for E-Saman System. Admin has privilege to access this system. To access this system, administrator needs the password and the username. Without the password and username, the system can`t be accessed by administrator. Password and username is top secret for this application to make this system is more secure. After getting all the information from, the research, E-Saman systems are suitable from UMP Security Department which, by using this system can help UMP Security Department control the traffic offender at UMP. By using this system, UMP security officer easy to summon student or staff that make traffic offender. E-Saman system can help UMP security officer handle and manage flow of traffic at UMP and it makes traffic at UMP look good and can protect from accident. E-Saman system also can make UMP security Department using modern equipment in their system. It can make UMP look as worldwide university.

Firstly, this system is not for client, but is handling by admin. Admin is person that responsible with this system. To access this system, admin must have their

password and username to use the system. After that, admin can manage the database and manage the GSM system. For manage the database, admin of this system can edit, delete and add new data. For the editing, admin can edit offender information if have same incorrect information. For delete, admin can delete the data from database if offender make a payment and show the receipt to UMP Security Department. For add function, admin can add new summon into database. The data is get from micro SD card. In this case, micro SD card used if don`t internet connection. Admin also can add new entity at database if have some improving at the E-Saman system.

Secondly is for GSM system, for GSM system, admin need to manage the GSM system to make sure the GSM modem or system can`t have problem. The GSM system always must to service and check because it works automatically. If GSM system have problem, it can`t sent the details of summon to offender. By using this system it can make UMP Security Department easier. By using this system, it make easy to monitor the database and can save loads of time. Using this system also can save load of paper because all process in this system can`t use paper. This system can save natural environments world.

3.4 Logical Diagrams

The system requirement for the E-Saman System has been transform into the context diagram and data flow diagram (DFD) for easy to understanding about the system flow. The DFD picture show the movement of the external entities, process of the system and the data stores in the database.

Figure 3.2 show the process of system flow E-Saman system. After UMP security guard officer summon the student or staff, the data of summon will be automatically sent into database. There are things UMP security guard officer needs to allow this application access which are Internet connection service. If they don`t have internet connection, the data will be save into memory card. After database get the information about offender, the database will be sent the information about summon to offender. The information will sent to offender using GSM system. The GSM system sent the information truth telephone number. The telephone number is important because without telephone number the information about summon can`t be

sent into offender. GSM system sent the information using short message service (SMS). The offender will receive the information by SMS.

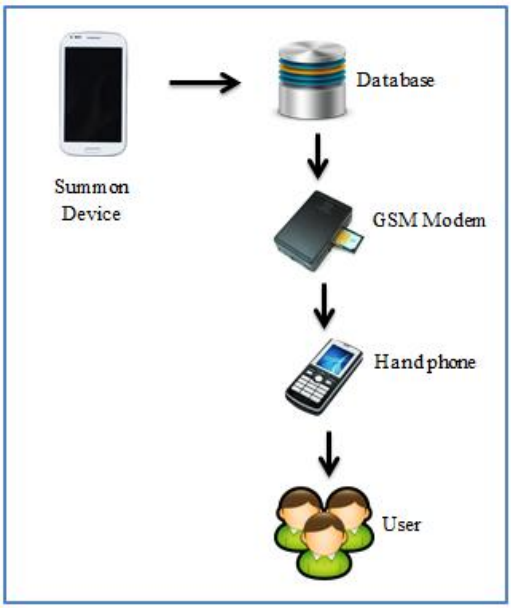

Figure 3.2: Logical diagram E-Saman system.

Figure 3.3 shows the DFD level 0 for UMP security guard office give summon and save the information about summon. In this level, UMP security officer can give summon into traffic offender and save the information about traffic offender into database. After save the data into database, database will received the data and can view the data of traffic offender.

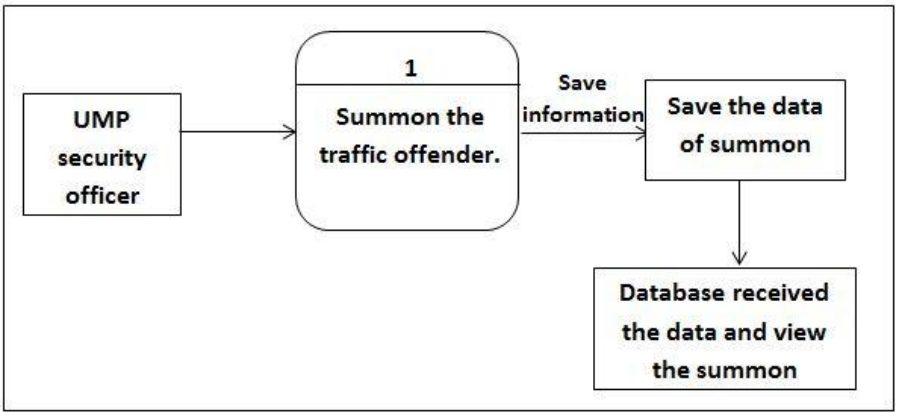

Figure 3.3: DFD level 0 for UMP security guard office summon the offender

Figure 3.4 show the DFD level 0 for GSM system sent the SMS. In this level database will be operate automatically to send the SMS to traffic offender. The database detects the telephone number of offender and sent to GSM system to process. The GSM system will received the telephone number with data of offender and sent the information about traffic offender using SMS service

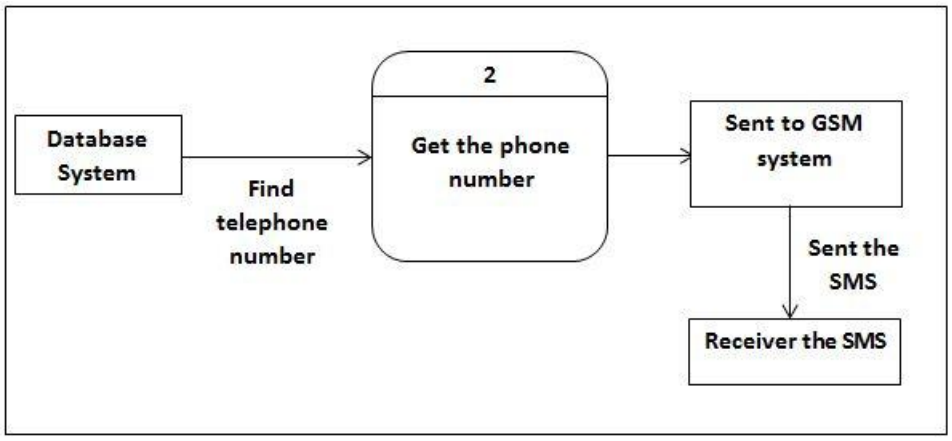

Figure 3.4: DFD level 0 for GSM sent the SMS.

Figure 3.5 show the DFD level 1 process of deleted data from database. In this level, data of traffic offender will be deleted after they make a payment. The data will be deleted manually by UMP security guard officer. If the traffic offender can`t make the payment, the data about they summon will be save until make the payment. For graduation or convocations student, they need to pay first before UMP officer give the transcript.

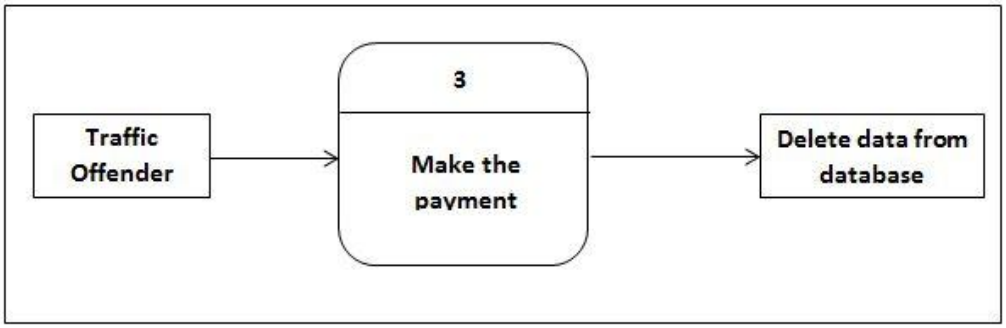

Figure 3.5: DFD level 1 process delete the data

Figure 3.6 show the context diagram of GSM system. The picture shows step by step process of GSM system. The process starts from the sql database. The sql database will store the database of summon. The sql database will sent the data about summon into web server. After that, the webserver will be proccess the data from sql server. Web server procces the data and sent into SMS server. SMS server will be receive the data and connect to GSM modem. The SMS server give GSM moden the number telephone of traffic offender. The GSM moden sent the details about traffic offenses to traffic offender. Traffic offender will be received the SMS details about summon.

Figure 3.6: Logical diagram of GSM system

3.5 Data Dictionary

Data dictionary is a medium to store the whole of data about the E-Saman. It defines and describe the element that have in data. Tables 3.1 show the data dictionary for Admin database of E-Saman System. In the table have three of entity. The entities are id, username and password. The details about entity can see at table below.

Table 3.1: Data Dictionary for Admin database E-Saman System

No.	Field	Type	Length	Description
1.	id	AUTO_INCREMENT	-	number
2.	Username	varchar	20	Username for administrator
3.	Password	varchar	20	Password for administrator

Table 3.2 shows the table of data personal information for summon table of E-Saman System. In this table have seven entities. The entities are , name, matric number, IC number and telephone number. This all entities are important to make database system more complete. The details about entity can see at table below.

Table 3.2: Data Dictionary for personal information database E-Saman System

No.	Field	Type	Length	Description
1.	Name	varchar	30	Name of offender
2.	Matric Number	varchar	20	Matric Number of offender
3.	IC Number	varchar	20	IC number of offender
4.	No Tel	Varchar	20	No Tel of offender

Table 3.3 shows the table of data dictionary for summon table of E-Saman System. In this table have six entities. The entities are matric number, type of offense, type vehicle, register number, date and status. This all entities are important to make database system more complete. The details about entity can see at table below.

Table 3.3: Data Dictionary for Summon database E-Saman System

No.	Field	Type	Length	Description
1.	Matric No	varchar	30	Matric Number of offender
2.	Type offense	varchar	30	types of traffic offenses
3.	Type vehicle	varchar	30	Type of vehicle use
4.	Register No	varchar	30	Register number of vehicle
5.	Date	varchar	30	Date of offenses
6.	Status	varchar	30	Payment status

3.6 Database Design

Database system is the most important part that has in each system. Without database, the system is look like unfinished system. The database must be design and create suitable with system. In order to complete this E-Saman system, the design of the database must be finish first before create the database. The database that is created may be able to be edited in case have the problem with database. The database is important part to make. Without database the information can`t be stored and the data not be secure.

Figure 3.7 shows the picture of database structure of E-Saman system. From the picture, can see two structure of table for database for E-Saman system. In this table there are two types of table is admin and summon. These two tables of database has different function each other. Figure 3.8 show the structure of database for admin of E-Saman System. In these tables there are three entity of database is id, username and password. The id is auto increment because it will automatically insert. Username and password important because without username and password can`t access this database system. Administrator is people are responsible with this database system. The administrator that only has password and username can access this database system. This database system must be secure to make sure all data and information are saving from irresponsible person. Figure 3.9 show the structure of database for offender personal information of E-Saman System. In the structure of database have four entities that included completing the database. The entity is matric number, name of traffic offender, IC number and telephone number. Figure 3.10 shows the database structure for summon of E-Saman System. In the structure of database have six entities to completing the database. The details about entities can refer at table below. This all entity is important to make the system complete and suitable with the system. For each entity they have own function and it must related each other.

Table	Action	Records	Type	Collation	Size	Overhead
admin		~0	InnoDB	latin1_swedish_ci	16.0 KiB	-
summon		~0	InnoDB	latin1_swedish_ci	16.0 KiB	-
2 table(s)	Sum	~0	InnoDB	latin1_swedish_ci	32.0 KiB	0 B

Figure 3.7: Database table of E-Saman system

	Field	Type	Collation	Attributes	Null	Default	Extra	Action
	Id	int(20)			No		auto_increment	
	Username	varchar(20)	latin1_swedish_ci		No			
	Password	varchar(20)	latin1_swedish_ci		No			

Figure 3.8: Database Structure for admin of E-Saman system

#	Name	Type	Collation	Attributes	Null	Default	Extra	Action
1	matric	varchar(7)	latin1_swedish_ci		No	None		Change Drop Primary Unique Index Spatial Fulltext Distinct values
2	name	varchar(35)	latin1_swedish_ci		No	None		Change Drop Primary Unique Index Spatial Fulltext Distinct values
3	ic	varchar(12)	latin1_swedish_ci		No	None		Change Drop Primary Unique Index Spatial Fulltext Distinct values
4	notel	varchar(10)	latin1_swedish_ci		No	None		Change Drop Primary Unique Index Spatial Fulltext Distinct values

Figure 3.9: Database Structure for offender personal information of E-Saman system

#	Name	Type	Collation	Attributes	Null	Default	Extra	Action
1	matric	varchar(7)	latin1_swedish_ci		No	None		Change Drop Primary Unique Index Spatial Fulltext Distinct values
2	type_offense	varchar(35)	latin1_swedish_ci		No	None		Change Drop Primary Unique Index Spatial Fulltext Distinct values
3	type_vehicles	varchar(20)	latin1_swedish_ci		No	None		Change Drop Primary Unique Index Spatial Fulltext Distinct values
4	registration_number	varchar(10)	latin1_swedish_ci		No	None		Change Drop Primary Unique Index Spatial Fulltext Distinct values
5	date_time	date			No	None		Change Drop Primary Unique Index Spatial Fulltext Distinct values
6	status	varchar(10)	latin1_swedish_ci		No	None		Change Drop Primary Unique Index Spatial Fulltext Distinct values

Figure 3.10: Database Structure for summon of E-Saman system

3.7 Interface Design for E-Saman System using Web Script

This subtopic will be explain and discuss about the interface of E-Saman System. The interface are using by the administrator and user of E-Saman System. Figure 3.11 show the interface of login page for E-Saman system. Three type of user can access thus this system are administrator, security officer and user. Each user need to insert the correct password and username to access this system.

Figure 3.11: Login page for E-Saman system

Figure 3.12 show the interface of main page for E-Saman system. After successful login the administrators or user will go into main page. The main page will display the information about all summon store in database. From main page the administrator can edit, delete or create the new summon using manual inserting data. The administrator is person responsible to update the data if offender makes a payment.

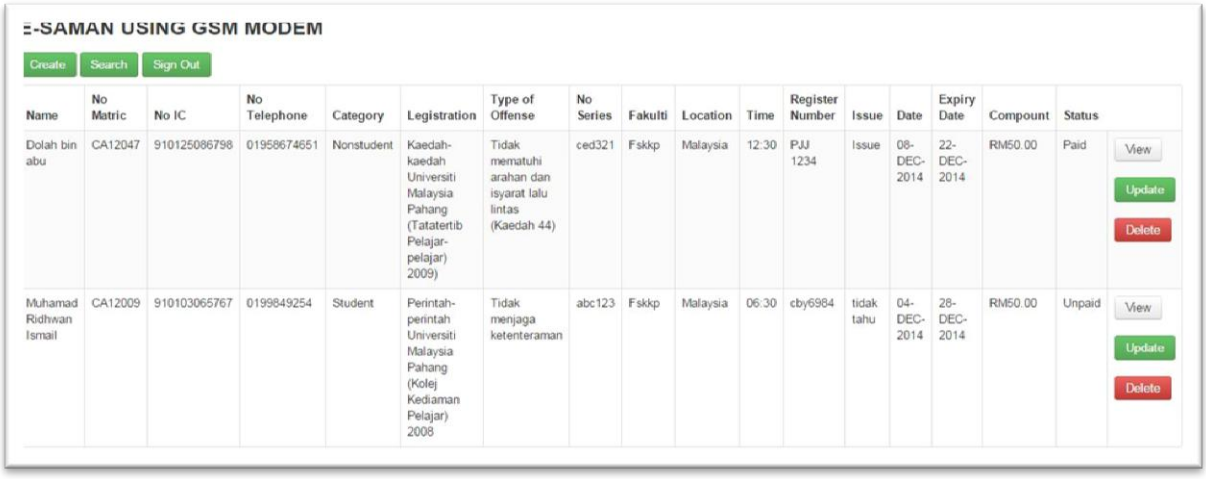

Figure 3.12: Main page for E-Saman system

Figure 3.13 show the interface of Create and update page for E-Saman system. Function of create page are to create summon manually if the mobile system cannot using online system or have problem with the online database. Using create system manually the security officer need to insert one by one data into the system. Functions of update page are to update the information if have any mistake or update the payment status. The payment status only can update by administrator.

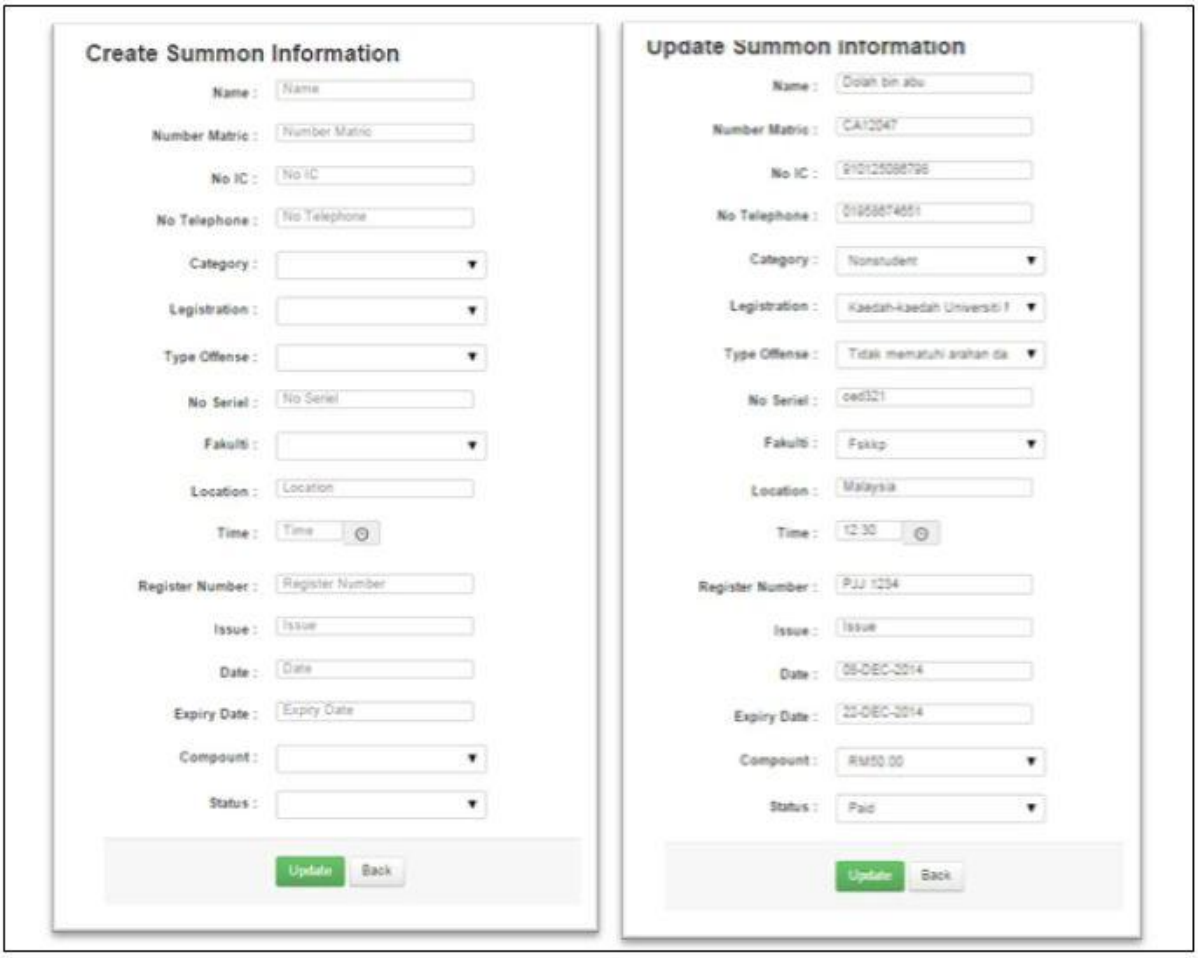

Figure 3.13: Create and update page for E-Saman system

Figure 3.14 show the interface of view page for E-Saman system. Function of view page are to view the summon information. These view pages are important for used or offender to check summon. The offender need to prints the summon information from this view page and go to security office to make a payment or make appeal. The view summon is new additional system that create from current system.

The current systems not user friendly because the offender cannot check summon to know details of summon.

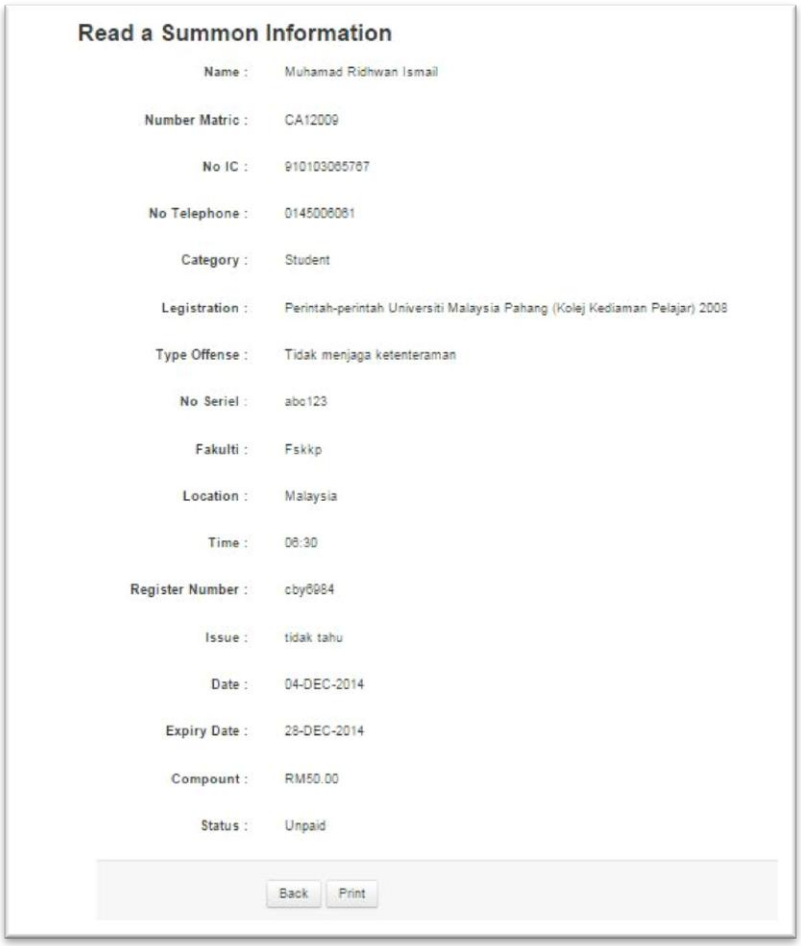

Figure 3.14: View page of E-Saman System

Figure 3.15 shows the interface of E-Saman System using GSM modem. This interface is creating from VB.net. This system shows the data from the database. This system is used to send the SMS to traffic offender. The traffic offender that cannot make the payment and the status are unpaid. The system will detect the status unpaid and sent the SMS to them. After sent all SMS to unpaid traffic offender, this system will show the popup status SMS successful sent and system automatically close.

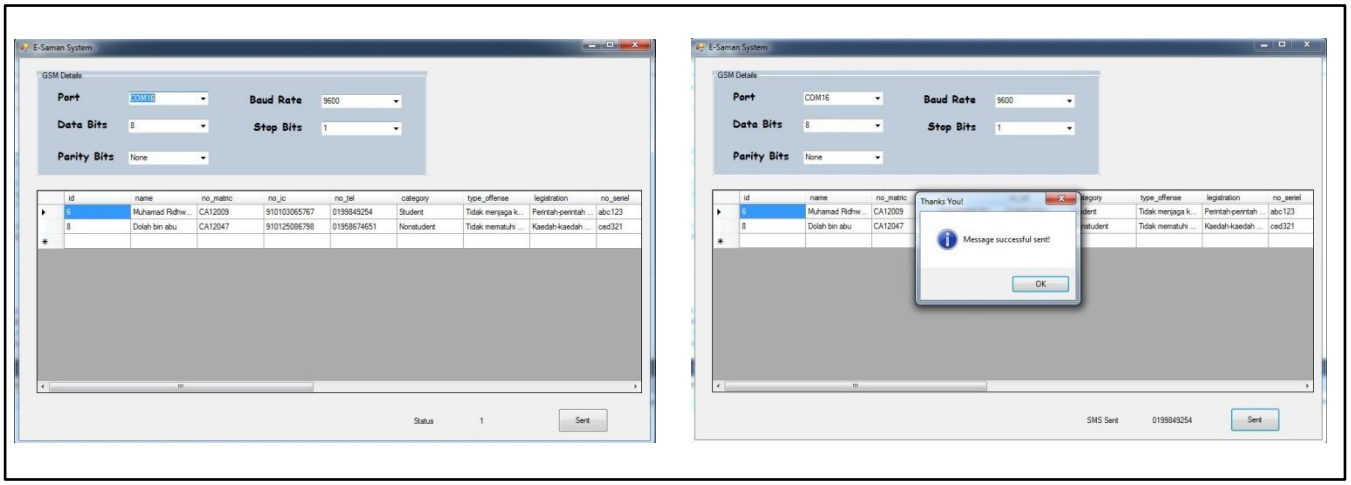

Figure 3.15: Interface of E-Saman System using GSM modem

Figure 3.16 show result from E-Saman System Using GSM Modem. The massage gets from GSM Modem. From this massage can see the name, matric number and date of traffic offender. All information gets from database system and sent using GSM modem.

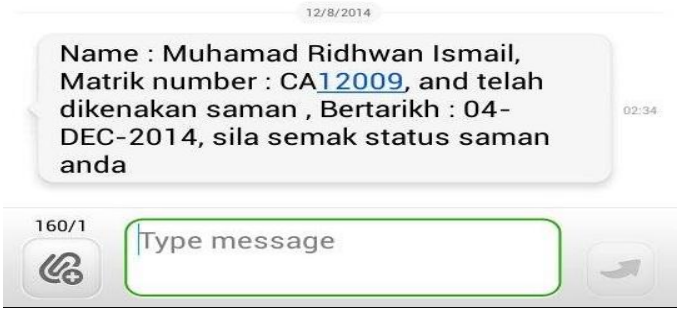

Figure 3.16: Result of message from GSM Modem

3.8 Hardware Requirement

In the process to develop this system, some hardware is needed to use during the developing process. Hardware is important to make system more useful and more function. Figure 3.17 show the example of GSM Modem and SanDisk card. These

two devices are part of this E-Saman System. The GSM Modem is medium to send the information to offender and SanDisk use for store the database at internal device if do not have internet connection.

Figure 3.17: GSM modem and SanDisk memory card

Table 3.2 show the table of hardware requirements of E-Saman System. The hardware requirements that are required in this E-Saman System are GSM Modem, memory card, computer and the mobile phone. The details about the hardware specifications can see at table below.

Table 3.4 Hardware Requirements

Hardware	Specifications	Purpose
GSM Modem (HSDPA 3G USB GSM Modem)	• Support HSDPA/UMTS 900/2100 MHz • GSM/GPRS/edge 900/1800/1900 MHz • USB slot, SMS message and data services • Data transmission up to 7. 2 mbps (HSDPA) • Data transmission up to 384 kbps (EDGE) • Data transmission up to 384 kbps (GPRS) • High capacity phone book and auto	To communicate with telephone and server

	installation • OS: win2000/win7/XP/vista/ubantu8. 04/mac • Downlink: 7. 2mbps uplink: 384kbps • Can use any GSM SIM card and storage capacity up to 2gb	
Memory Card (SanDisk MicroSDHC)	• Form factor: microSDHC • Capacities: 8GB,16GB Performance: read speed up to 95 MB/s Write speed up to 90 MB/s • Dimension: 15 mm x 11 mm x 1.0 mm • Operating temperature: -25ºC to 85 ºC • Storage temperature: -40ºC to 85ºC Compatibility: Compatible with all microSDHC and microSDHC UHS-I supporting host devices RescuePro® Deluxe data recovery software downloadable offer	To store the data in device
Computer	• Intel(R) Core(TM) i5-3210M Processor • Hard Disk : 500 GB • RAM: 6GB DDR2 • OS:Win7 64-bit	To work as a server and store a database
Mobile Phone	• Basic function of mobile phone text messaging or officially called SMS (Short Messages Services)	To receive the SMS from GSM and test function of GSM

3.9 Software Requirements

In process to develop this system, some software is needed to use during the developing process. Table 3.3 show the table of software requirements of E-Saman System. The software requiprement that needed in this E-Saman System are MySQL and Net beans. The details about software specification can see in table below.

Table 3.5s Software Requirement

Software	Specifications	Purpose
MySQL	• Written in C,C++ • Multilayered design with independent modules • Fully multi-threaded using Kernel Threads. • In memory heap table support. • Security and privilege management • Large database, large table (up to 256 TB) • OS: Linux 2.2 and 2.4, Solaris 9/10, NetWare w/NSS file system, win32 w/ FAT/FAT32, win32 w/ NTFS, MacOS X w/ HFS+	To store the database
Net beans	• Written in Java, PHP,C/C++ • OS: Windows, OS X, Linux, Solaris and other platforms supporting a compatible JVM • Support for latest Java specifications & standards • Supports the J2EE 1.3 and 1.4 standards with web application build support based in Apache. • XML, DTD and CSS Text Editor and XML Productivity Tools Wizards to help user generate codes.	To make system for GSM system

CHAPTER 4

DESIGN AND IMPLEMENTATION

4.1 Overview

In this chapter, two subtopics which are subtopic 4.2 that will explain in detail about the tools and technologies, and subtopic 4.3 that will explain on the test debugging and running the E-Saman System Using GSM Modem. Subtopic 4.2 will discuss more on the technique of implementation for the project including the sample programming script and use of device in developing the application. Subtopic 4.3 will discuss more on the flow of user using the E-Saman system including with detail explanations of each functions available on the application.

Overall contents in this chapter will provide reader with the detail information of the method of implementation phase of the E- Saman System Using GSM Modem. The implementation phase focuses on the development of the workable system activities. The implementation activities include the system coding, debugging and documenting. System coding and debugging are the main activities in this implementation phase. The coding includes the structure of the coding system that is used to run the functions in this system. During the implementation, the developer has to ensure that he has fulfilled the system requirements before implementing the system to avoid the system error or any complications. In this implementation stage, the system will be developed step by step based on function modules.

The implementation phase is an important phase in order to develop an effective system. In this phase, the developer will determine the tools that will be used to implement the system, starting from building interfaces to running the system with the free error until completing all functions that have been stated in the previous

chapter. The programming is the main factor of this phase whereby the developer has to manage the coding properly to make sure the system run with free error and to determine the effectiveness of the system. The software development environment setup, software and the implementation status of the system will be discussed in this chapter.

4.2 Tools and Technologies

E- Saman System Using GSM Modem is developed using Microsoft Visual Basic.NET for the interface and function. Other than providing interfaces. The application runs by using the Visual Basic script. The software also uses GSM MODEM in order to provide the sending message SMS. This system also used web scripting as tool for user to check summon and for admin to update the information about summon. HTML and PHP are chosen to make the interface and the system for user and admin.

4.3 Debugging and Running the System

After finishing the VB.NET coding, the developer needs to run or debug the system to test the running system if there any syntax error or error in the coding stage before. As we know, the system running needs to be run by using VB.Net debugging. To test whether the information of summon can be send using SMS to offender or not. If cannot sent to offender, the coding have same problem and must be fix to solve the problem. This E-Saman system also uses web script languages. The web scripts are used for insert, delete, and view and update the data. The administrator can update and insert the new data of offender using web script languages. The web script also needs to run or debug to check if have and syntax error that can make the information cannot be store into database.

Figure 4.1 show the login page for E-Saman System using GSM modem using web script. The administrator and guard officer need to login into this page before can proceed into next step

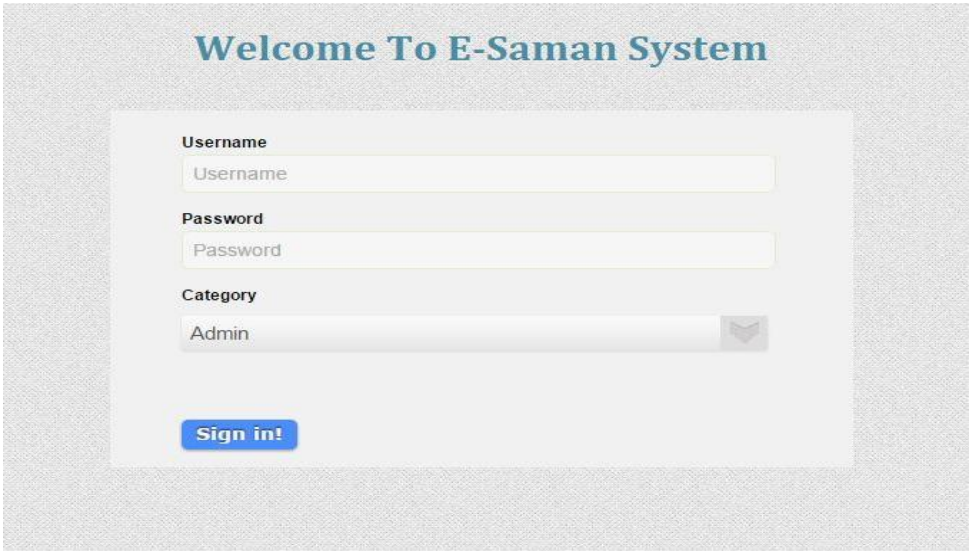

Figure 4.1: Login Page of E-Saman System using GSM modem.

Figure 4.2 show the main page of E-Saman System using GSM modem. At this page the administrator can create, search, update, view and delete the summon information. This main page show all information about summon and details for each summon. It easy to administrator to check summon and make an update.

Figure 4.2: The main page of E-Saman System using GSM modem.

Figure 4.3 show the interface of Create and update page for E-Saman system. Function of create page are to create summon manually if the mobile system cannot using online system or have problem with the online database. Using create system manually the security officer need to insert one by one data into the system. Functions of update page are to update the information if have any mistake or update the payment status. The payment status only can update by administrator

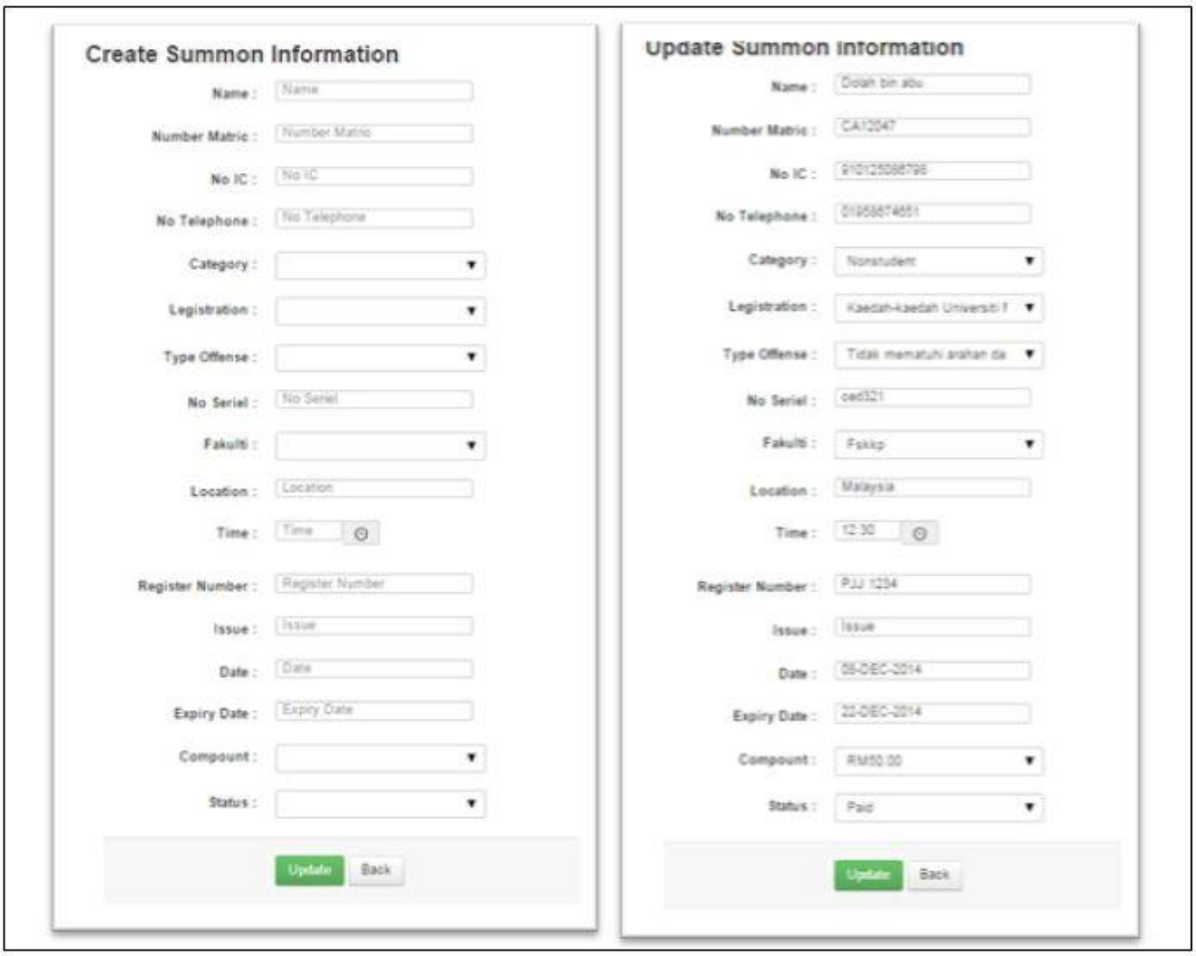

Figure 4.3: Create and update page for E-Saman system.

Figure 4.4 show the search page of E-Saman System using GSM modem. Using this page the user, administrator and security officer easy to search the summon information. There just need to insert the matric number or name of offender to search the information. It more easy and fast to check summons.

Figure 4.4: The search page of E-Saman System using GSM modem.

Figure 4.5 show the interface of view page for E-Saman system. Function of view page are to view the summon information. These view pages are important for used or offender to check summon. The offender need to prints the summon information from this view page and go to security office to make a payment or make appeal. The view summon is new additional system that create from current system. The current systems not user friendly because the offender cannot check summon to know details of summon.

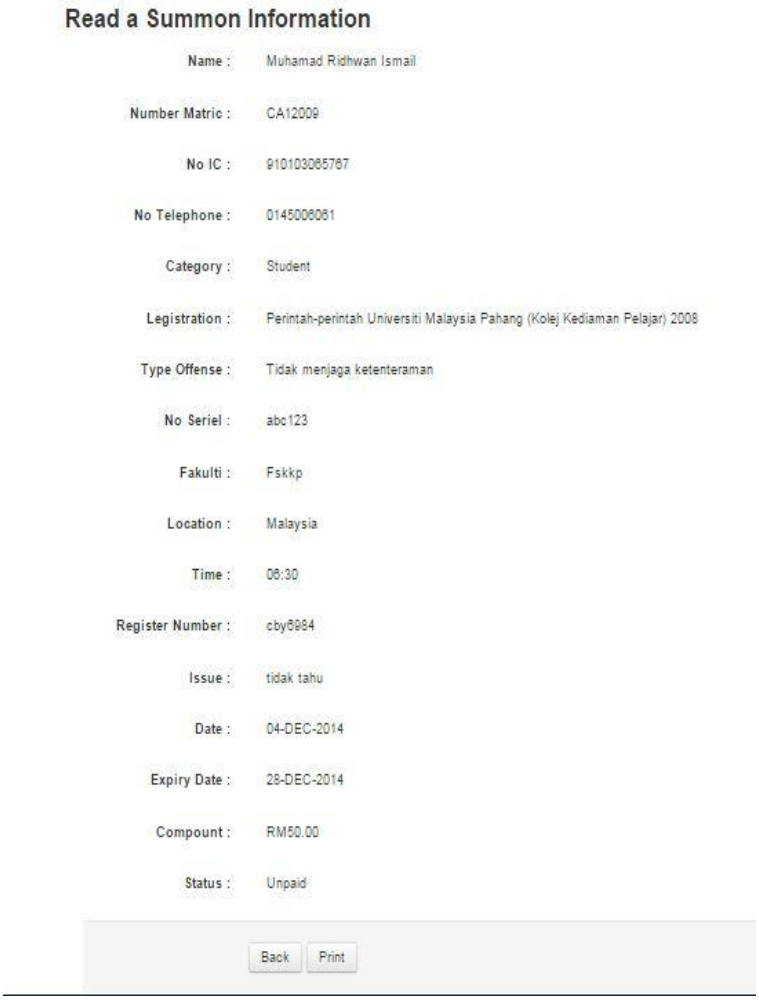

Figure 4.5: The view page of E-Saman System using GSM modem.

Figure 4.6 show the form of E-Saman System Using GSM modem. This interface using VB.net. These system shows the information of summon and interface for sending the SMS into offender. This system used by administrator to send the SMS to traffic offender. The administrator needs to select the port, data bits, parity bits, bound rate and stop bits. The administrator needs to select the correct selection for each bits and port. After select all bits and port, administrator just needs to click at sent button to send the SMS and SMS sent automatically into unpaid traffic offender. Figure 4.7 show the form after sent SMS to traffic offender. The massage pop up will show to inform SMS successful sent. Figure 4.8 show the result of massage from GSM modem. The result display name, matric number and date of traffic offender.

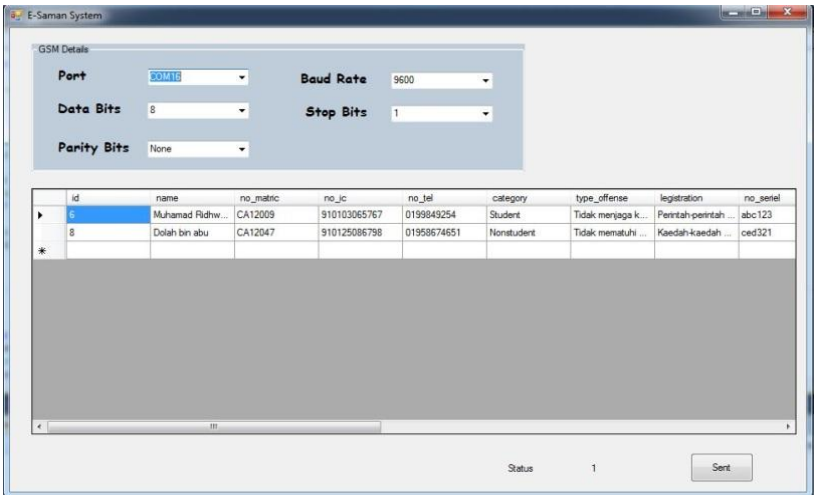

Figure 4.6: The form for sent SMS using GSM Modem

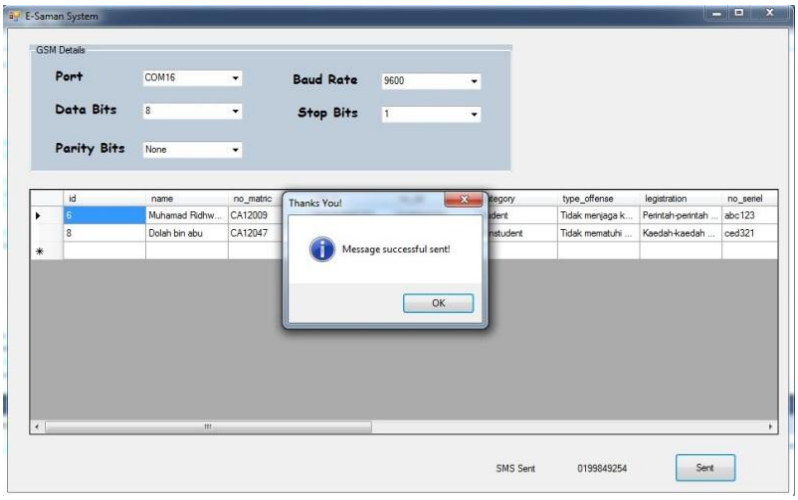

Figure 4.7: The message popup after sent SMS

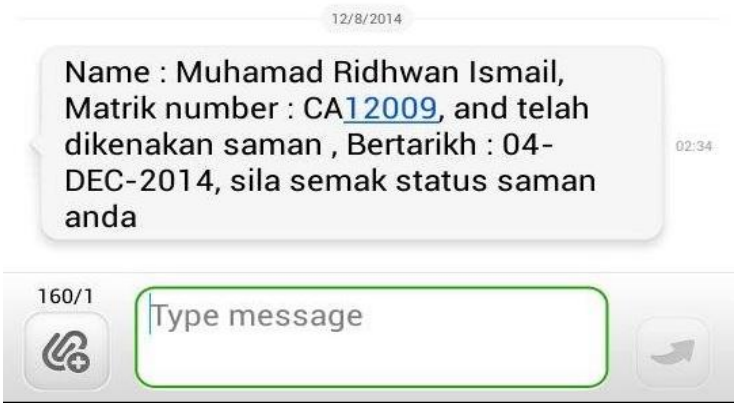

Figure 4.8: Result of message from GSM Modem

Figure 4.9 shows the database of list summon information. All information about summon can see from this database table. These all data is important because evidence that the offense was committed. The example of information that have in database such as name, matric number, IC number, contact number and type of vehicle. Figure 4.10 show the database information list of student and staff. This database saves the information about staff and student. The information such as IC number, name, matric or staff number and telephone number.

	id	name	ic	matric	contact	vehicle	plat	date	time	kod_salah	location	summonBy	amount	status
Edit Copy Delete	1	llg	5634534	ca12103	3345345	Motorcycle	gg321	0000-00-00	06:42:54.000000	1				
Edit Copy Delete	2	nazz	910621	ca12103	01333	Car	bhs3000	2014-03-03	14:03:13.000000	1				
Edit Copy Delete	3	fds3	32423	ca12103	32423	Car	adf234	0000-00-00	16:23:45.000000	20				
Edit Copy Delete	4	jrth	56443	ca12103	453436	Car	fdh564	0000-00-00	17:15:42.000000	19				
Edit Copy Delete	5	gdfsg	523542421341	ca12004	363453			0000-00-00	17:30:14.000000	1				
Edit Copy Delete	6	fasdf	45656734	ca12004	5363			0000-00-00	17:32:40.000000	1				
Edit Copy Delete	7	fsda	5643	ca12004	5234	Motorcycle	bnd856	0000-00-00	17:33:03.000000	16				
Edit Copy Delete	8	fa	32423	ca12004	32423			0000-00-00	17:44:51.000000	1				
Edit Copy Delete	9	dfg	43534543	ca12004	433434343	Car	ghf432	0000-00-00	17:45:17.000000	21				
Edit Copy Delete	12	wer	123	ca12004	14			2014-02-03	18:02:01.000000	28				
Edit Copy Delete	13	mamat khalid	5911234567	ca12004	0198765654	Car	bhs3000	2014-04-03	18:04:29.000000	18				
Edit Copy Delete	14	abu	543211234	ca12004	45231			2014-00-07	08:00:39.000000	1				
Edit Copy Delete	15	fdss	5634722	ca12004	74565464			2014-12-07	09:12:56.000000	1	kk2			
Edit Copy Delete	16	acaq	512342	ca12004	221134			0000-00-00	09:30:54.000000	1	kk4			
Edit Copy Delete	17	babun	3241	ca12004	53124			0000-00-00	09:41:07.000000	1	k3	user		
Edit Copy Delete	18	alibaba	795270	ca12004	3220347			0000-00-00	09:48:23.000000	1	safety first	user	RM50	Unpaid

Figure 4.9: The database table for summon information.

ic	name	matrik	fakulti	notel
2147483647	zulhelmi	ca12103	FSKKP	136362151
2147483647	zulhelmi	ca12103	FSKKP	136362151
910415105043	zulhelmi	ca12103	FSKKP	135352151

Figure 4.10: The database table for student and staff

Figure 4.11 show the database information of security officer. The database store the information about security officer that make summon. The information of security officer will display at Mobile Application for E-Saman went they make summon. It important to know the security officer that makes summon because it will responsible for the summons has been done. Summon and the security officer will store into database. Figure 4.12 show the list of type of offender. List of offender will select from database and it will show at Mobile Application for E-Saman System. This information are important because it used to select type of offender before insert into summon database information

	uid	name	matric	password	location	contact	access	ic	department
Edit Copy Delete	1	Muhammad Nazmi	user	user	ff	454	1	910415105043	Bahagian Keselamatan

Figure 4.11: The database information of security officer

	kod	discription
Edit Copy Delete	1	Merokok (kesalahan 19)
Edit Copy Delete	2	Tidak menjaga kebersihan di dalam kampus (kaedah 2...
Edit Copy Delete	3	Membuat bising dalam kampus (kaedah 22)
Edit Copy Delete	4	Tinggal atau tidur selain tempat yang dikhaskan da...
Edit Copy Delete	5	Tidak mematuhi arahan cara berpakaian pelajar (sub...
Edit Copy Delete	6	Ingkar arahan pegawai atau pekerja Universiti (sub...
Edit Copy Delete	7	Memasuki atau berada di bilik yang diduduki pelaja...
Edit Copy Delete	8	Menghalang pegawai daripada masuk dan menjalankan ...
Edit Copy Delete	9	Berada di luar asrama pada waktu malam tanpa izin ...
Edit Copy Delete	10	Bukan pelajar menetap berada di dalam premis asram...
Edit Copy Delete	11	Tidak menggunakan premis asrama dengan cermat (kae...
Edit Copy Delete	12	Tidak menggunakan premis asrama dengan cermat hing...
Edit Copy Delete	13	Bertukar bilik tanpa kebenaran (kaedah 34)
Edit Copy Delete	14	Ingkar berpindah tempat tinggal / kolej sebagaiman...
Edit Copy Delete	15	Tiada kebenaran bertulis untuk menyimpan, memiliki...
Edit Copy Delete	16	Memandu kenderaan melebihi had laju (kaedah 39)
Edit Copy Delete	17	Memandu kenderaan motor selain di jalan raya (kaed...
Edit Copy Delete	18	Meletak kenderaan secara menghalang (kaedah 41)
Edit Copy Delete	19	Menggunakan ruang letak kereta yang telah diuntukk...

Figure 4.12: The list of type of offender

CHAPTER 5

RESULTS AND DISCUSSION

5.1 Overview

In this chapter, there are six subtopics including the overview which are Subtopic 5.2, Subtopic 5.3, Subtopic 5.4 and Subtopic 5.5. Subtopic 5.2 will discuss on result from this project and continue with Subtopic 5.3 which is discussion. It continues with Subtopic 5.4 which will discuss on the project constraint. Subtopic 5.5 will explain on the advantages and disadvantages of the application.

5.2 Results

Based on the project proposal paper, a prototype that is going to help the users/security officer to check, insert, update and delete summon from database and also manage to send the data and information to the receiver. This prototype is proposed to overcome the manual process that includes in the hand-to-hand transfer of summon information. Hopefully, the system can be accessed by the users and successfully execute smoothly. This system is also created to replace the existing manual process which does not efficient and late of transfer data from paper into system. The system will comprise insert, delete. View and update interface and sending SMS interface. This system will be built in English language because English is an international language. Everyone can understand the language very well. Besides, the message or information that wanted to be send also can be in any or user language.

Transferring data via SMS has considerable benefits over traditional paper based memo and portal systems. Through this prototype, the offender can check summon using website that created. The current system does not allow offenders to check for mistakes that have been made. The summon information can be sent at any

time across the world as easily to a group or people or a single recipient without the sender leaving their desk by using SMS service wherever they are. Moreover, the recipient will receive the message directly without passing through any third-party.

5.3 Discussion

In order to make the prototype easy for the users, the interfaces that have been designed should be as simple as possible. The users will not have to spend more time in understanding the system before they started using the system's application. It is designed and implementation of high security. Furthermore, this system is very user friendly. The system designed for people should be easy to use, learn and more satisfying to use. So, the users will not have any difficulties in using the prototype. The prototype developed managed to execute the main function that is encrypting the confidential data successfully. The prototype also has shown that the data can be transferred when two users in different place and different time.

5.4 Project Constraint

Project constraint is the constraint in this development project. It consists of three components such as development constraint, software constraint and hardware constraint.

5.5 Advantages and Disadvantages of the system.

The advantages of this system is more easy and user friendly that current system. From this system the traffic offender can check their summons and view the details of summon easily. This system database is easy to store because it used online system. The database automatically saves into database after the security officer make summon to traffic offender. This system also gives notification to traffic offender using SMS system. The SMS system control by administrator and it will be sent SMS about details of summon to traffic offender. The unpaid status in database will receives the SMS notification.

The disadvantage of this system is the administrator need always update with system to monitor and check the summons that insert into database. The system uses the GSM Modem in order to send SMS. The user needs a GSM modem in order to execute the SMS function.

CHAPTER 6

CONCLUSION AND FUTURE WORKS

6.1 Overview

In this chapter, there are two subtopics including the overview which are Subtopic 6.2, Subtopic 6.3. Subtopic 6.2 will discuss on conclusion of E-Saman system. It continues with Subtopic 6.3 which will discuss on the recommendation of E-Saman system. The recommendation will discuss about future technology that can be used to make E-Saman system more useful and used latest technology.

6.2 Conclusion.

This system has been planned in target to solve the problem with security department of Universiti Malaysia Pahang. Generally, the main problem faced by UMP security unit was they could not insert the summon information in existing system on time. This problem was mainly because of the existing system works manually. All of the summon data needs to be inserted one by one into the database and it took long time to complete it. Thus, the system was developed in order to solve this problem. Before begin developing the system, a research about strength and weaknesses of current system have been done. These weaknesses were important to be identified as a new perfect system could be developed. After all the important data and information have been collected, the E-Saman system could be built. E-Saman system developing process used two types of development tools which were VB.net and Adobe Dreamweaver. The VB.net was used to make interface and coding for GSM technology. GSM technology was used to send message about the offense information to the traffic offender. The programming language that was used to send

message were vb.net and Object Oriented Programming. Adobe Dreamweaver was used to make web based interface for E-Saman System. This web based E-Saman System was used by admin, security officers and traffic offenders. Admin and security officers were the responsible person in updating, deleting and creating new summon. While the traffic offender used the system to check and print summon. The traffic offenders have to print their offense information and went to security unit to solve their summon. The completed system should be tested to identify the weakness and error of the system. If there was any problem regarding the system, it should be solved to make sure the system was accomplished. This system have been added with more security features to ensure the summon information were safe. The database security was important because to guarantee all the offenders information were safe from any intruders. All objectives have been achieved because all process involved have been done. It is important as to make sure the system was completely and perfectly developed. The E-Saman system used GSM Modem because it is a system which was used to send notification message to traffic offenders. Besides, it can be used to update, delete, create and view the summon information.

6.3 Recommendation.

In corresponding to the overall results of the project, there were several recommendations that can be suggested for the future works on E-Saman System Using GSM Modem.

- Future works can be done by using just one application system such as using VB.net to send the message and edit, delete, create and update. Using just one application system can make the system more systematic and easy to manage.
- Add more functions at the system which E-Saman system can reply the message from offender. The offender can send message to E-Saman system and the system response the message and reply with the summon details.
- Create one mobile application E-Saman System. The mobile application can be downloaded from Google application or Apple store. This mobile application is used to communicate between security officer admin and user. Function of mobile application is to check summon, make some comment about summon system, security officer behaviour and so on. This application

is faster solution to communicate with security department without meet each other.

- Make this system can automatically send message. After security officer make summon and sent the details of summon into database, the GSM system will sent the details of summon to offender automatically.
- Used other technology that is cheaper and no used credit when sending the message. The GSM modem needs the sim card and credit to send the massage. Suggests other technology which is more sophisticated compare to GSM modem.

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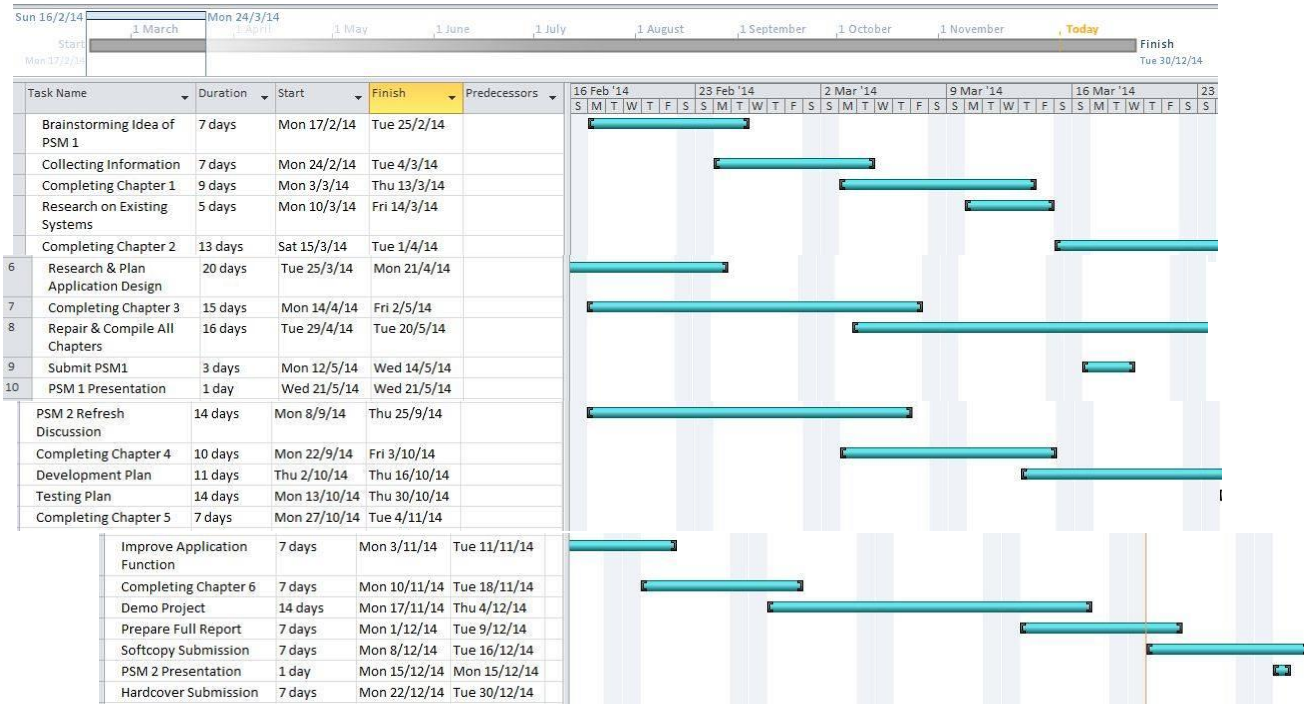
APPENDIX A

Activity Gantt chart



	Task Name	Duration	Start	Finish	Predecessors
	Brainstorming Idea of PSM 1	7 days	Mon 17/2/14	Tue 25/2/14	
	Collecting Information	7 days	Mon 24/2/14	Tue 4/3/14	
	Completing Chapter 1	9 days	Mon 3/3/14	Thu 13/3/14	
	Research on Existing Systems	5 days	Mon 10/3/14	Fri 14/3/14	
	Completing Chapter 2	13 days	Sat 15/3/14	Tue 1/4/14	
6	Research & Plan Application Design	20 days	Tue 25/3/14	Mon 21/4/14	
7	Completing Chapter 3	15 days	Mon 14/4/14	Fri 2/5/14	
8	Repair & Compile All Chapters	16 days	Tue 29/4/14	Tue 20/5/14	
9	Submit PSM1	3 days	Mon 12/5/14	Wed 14/5/14	
10	PSM 1 Presentation	1 day	Wed 21/5/14	Wed 21/5/14	
	PSM 2 Refresh Discussion	14 days	Mon 8/9/14	Thu 25/9/14	
	Completing Chapter 4	10 days	Mon 22/9/14	Fri 3/10/14	
	Development Plan	11 days	Thu 2/10/14	Thu 16/10/14	
	Testing Plan	14 days	Mon 13/10/14	Thu 30/10/14	
	Completing Chapter 5	7 days	Mon 27/10/14	Tue 4/11/14	
	Improve Application Function	7 days	Mon 3/11/14	Tue 11/11/14	
	Completing Chapter 6	7 days	Mon 10/11/14	Tue 18/11/14	
	Demo Project	14 days	Mon 17/11/14	Thu 4/12/14	
	Prepare Full Report	7 days	Mon 1/12/14	Tue 9/12/14	
	Softcopy Submission	7 days	Mon 8/12/14	Tue 16/12/14	
	PSM 2 Presentation	1 day	Mon 15/12/14	Mon 15/12/14	
	Hardcover Submission	7 days	Mon 22/12/14	Tue 30/12/14	

APPENDIX B

Function Code from VB.net

```
Imports System.Data.SqlClient
Imports MySql.Data.MySqlClient
Imports System.Linq
Imports System
Imports System.Threading
Imports System.ComponentModel
Imports System.IO.Ports
Imports System.Data.OleDb
Public Class SAMAN
    Public cons As String
    Public usertype As String
    Public cmd As New SqlCommand
    Public strSql As String
    Public dadapter As New SqlDataAdapter
    Public datardr As SqlDataReader
    Public Con As SqlConnection
    Dim sBuilder As SqlCommandBuilder
    Dim ds As New DataSet
    Dim sTable As DataTable
    Dim source1 As New BindingSource()
    Dim total
```

Global Variable

```
Sub SAMAN()
    Try
        Dim SerialPort1 As New SerialPort
        Dim connString As String = "Database=esaman;Data Source=localhost;" _
            & "User Id=root;Password="
        Dim conn As New MySqlConnection(connString)
        Dim cmd As New MySqlCommand()
        Dim ada As New MySqlDataAdapter()
        Dim ds As New DataSet
        conn.Open()
        cmd.Connection = conn
        cmd.CommandText = "SELECT * FROM summons;"
        cmd.ExecuteNonQuery()
        conn.Close()
        ada = New MySqlDataAdapter("Select * from summons", conn)
        ada.Fill(ds)
        SerialPort1.PortName = ComboBox1.Text
        SerialPort1.BaudRate = cboBaudRate.Text
        SerialPort1.Parity = Parity.None
        SerialPort1.StopBits = cboStopBits.Text
        SerialPort1.DataBits = cboDataBits.Text
        SerialPort1.Handshake = Handshake.RequestToSend
        SerialPort1.DtrEnable = True
        SerialPort1.RtsEnable = True
        SerialPort1.NewLine = vbCrLf
        For i = 0 To total
            Try
                SerialPort1.Open()
                If SerialPort1.IsOpen() Then
                    Dim stat = ds.Tables(0).Rows(i).Item(15)
                    Dim notel = ds.Tables(0).Rows(i).Item(4)
                    Dim message1 = "Name : " + ds.Tables(0).Rows(i).Item(1) + ", " + ds.Tables(0).Rows(i).Item(3) + " anda
telah dikenakan saman pada " + "tarikh : " + ds.Tables(0).Rows(i).Item(8) + ", sila semak status saman anda."""
                    If stat = "Unpaid" Then
                        SerialPort1.Write("AT" & vbCrLf)
                        SerialPort1.Write("AT+CMGF=1" & vbCrLf)
                        SerialPort1.Write("AT+CMGS=" & Chr(34) & notel & Chr(34) & vbCrLf)
                        SerialPort1.Write(message1 & Chr(26))
                        System.Threading.Thread.Sleep(3500)
                        Label1.Text = "SMS Sent"
                        Label6.Text = notel
                    End If
                Else
                    Label1.Text = "Port not available"
                End If
            Catch ex As Exception
                Label1.Text = "No GSM modem connected"
            End Try
            SerialPort1.Close()
        Next
    Catch ex As Exception
        MsgBox(ex.Message)
    End Try
    Me.Refresh()
End Sub
```

Send SMS File Code

```
Private Sub Form1_Load(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles MyBase.Load
    Dim connString As String = "Database=esaman;Data Source=localhost;" _
            & "User Id=root;Password="
    Dim conn As New MySqlConnection(connString)
    Dim cmd As New MySqlCommand()
    Dim ada As New MySqlDataAdapter()
    Dim ds As New DataSet
    Try
      Dim Ports As Object
      Ports = SerialPort.GetPortNames()
      For Each port As Object In Ports
        ComboBox1.Items.Add(port)
      Next
    Catch ex As Exception
      MsgBox(ex.Message)
      DataGridView1.Refresh()
    End Try
    Try
      conn.Open()
      cmd.Connection = conn
      cmd.CommandText = "SELECT * FROM summons;"
      cmd.ExecuteNonQuery()
      conn.Close()
      ada = New MySqlDataAdapter("Select * from summons", conn)
      ada.Fill(ds)
      DataGridView1.DataSource = ds.Tables(0)
      total = ds.Tables(0).Rows.Count - 1
      Label6.Text = total
    Catch ex As MySqlException
    Finally
    End Try
    Me.Refresh()
  End Sub
```

Display the Data from Database File

```
Private Sub Button2_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles btnsent.Click
      Call SAMAN()
      MessageBox.Show("Message successful sent!", "Thanks You!",
MessageBoxButtons.OK, MessageBoxIcon.Asterisk)
      Me.Close()
  End Sub
```

Sent SMS Button