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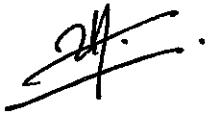
MMS Based Examination Result System

by

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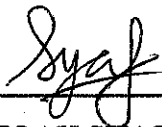
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CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.



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ABSTRACT

Multimedia Messaging Service (MMS) based examination result system was designed and developed to upgrade the previous developed Short Messaging Service System (SMS) based examination result system. There are few limitation on the previous SMS based examination result system which are lack of the information, validity of the information and storage limitation. The objective of this project is to develop a system that retrieves the image of the examination result slip using Multimedia Message Service (MMS) standard to user's mobile phone. The scope of study in this project is the retrieved image of the examination result slip is in JPEG or GIF format. Spiral Life Cycle Model is used as the methodology to develop this project. Tools required for this project are personal computer (Acer TravelMate 3210), GSM modem (Sony Ericsson W800i/W700i), NowSMS/MMS Getaway, Macromedia Dreamweaver 6 and MySQL Server 5.0. In the end, the MMS based examination result system will be able to retrieve a graphic view of an examination result slip through user's mobile phone thus giving the capability to store and print the examination result slip in other devices.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND STUDY

Currently UTP had only implemented online system for students to check their examination result. On 2004, a project called Retrieval of Final Exam Result via SMS had been created by final year student in order to make examination result viewable by SMS. The SMS examination result has limitations to users such as its limited capacity of only text message and also higher risk of losing the data because of storage space issues in user's mobile inbox. MMS Based Examination Result System upgrades the system from these limitations to a new level where a multimedia message (examination result slip) in PDF format can be viewed by users for their future reference. This MMS can also be stored to another mobile devices or other storage device as it will be in PDF format thus decrease the risk of data loss. Students send SMS via their mobile to retrieve their examination slip from the system. This system implements NowSMS as its gateway application to send or receive MMS/SMS messages to mobile devices with computer. SMS sent by users will be monitored and delivered by NowSMS where it then communicate with applications such as PHP or SQL that contain the examination result data. This data then is sent back in MMS form (examination result slip) to users on their mobile phone. MMS Based Examination Result System increases the efficiency and effectiveness of the current SMS system where user is provided with ability to store their data in another storage device and print the data for future reference.

1.2 PROBLEM STATEMENT

1.2.1 Limitation on information

The previous developed SMS based examination result can only contain text messages in limited characters with specific character set. Global System for Mobile Communications(GSM) had allowed mobile systems and other network-connected devices to exchange short text messages with a maximum length of

160 characters[1]. Due to the limitation that a single SMS message can contain only 160 7-bit characters or 70 UCS2/Unicode characters, it is necessary for a longer message to be conveyed using more than one SMS[2]. SMS also can only include specific; GSM Default Alphabet(7-bit), ISO 8859-1(ISO Latin-1)(8bit) and Unicode UCS-2(16 bit)[3].

1.2.2 Validity of information

SMS examination result is not valid for references to other formal parties such as UTP Examination Unit. The SMS result only contain text messages and does not capture the whole view of an examination result slip. According to the research conduct by Borzyskowski, how the text appears in the field of vision, what it does and how it looks as it appears, may influence how it is read or more precisely, what information is gained upon its observation and reading[4].

1.3 OBJECTIVE OF STUDY

To develop a system that retrieves examination result slip in PDF format using Multimedia Message Service (MMS) standard to user's mobile phone.

1.4 SIGNIFICANCE OF PROJECT

1.4.1 Improvement on storage limitation

SMS examination result has higher risk of data lost because of the storage limitation in user's mobile inbox. By implementing MMS Based Examination Result System, the data can be stored to other storage devices such as thumb drive or disc.

1.5 SCOPE OF STUDY

The scope of study in this project is:

- The examination result slip is in PDF format (read only).
- Targeted users are among Universiti Teknologi Petronas students.

- Users can only retrieved their last semester examination result slip.
- Examination result slip is only viewable using a mobile phone that had data viewer features or installed Adobe Reader application.

1.6 FEASIBILITY OF PROJECT

1.6.1 Technical Feasibility

The familiarity of the application, project size and compatibility are involves in determining the project technical feasibility. Table 1.1 list the risk and assumption of each factor.

Table 1.1 Technical Feasibility Risk

Factors	Risk	Assumption
Familiarity of the application	Low risk	SMS technology is not a new technology; hence users are familiar with the technology and this kind of application.
Project size	Moderate risk	The system resulted in the end of this project will be a prototype that simulates the actual system. The scope of the prototype is limited to some extent which will be discussed later.
Compatibility	Moderate risk	The system is dealing much with hardware (GSM Modem, Server).

1.6.2 Economic Feasibility

Since the software used is open source and freeware, there is no cost required to develop the project. The hardware used is developer's personal belongings. However, actual development and operating costs of the actual product cannot be determined at this stage because it involves research on the actual information.

1.6.3 Organizational Feasibility

This project has low risk from an organizational point of view. The objective of this project can bring many benefits and advantages to the university. The universities, college and other organization which has examination result retrieval system is expected to be the champion of the actual project. The users of the system, students, are expected to benefit from the MMS Based Examination Result System presence.

CHAPTER 2

LITERITURE REVIEW

2.1 INTRODUCTION

2.1.1 PHP

PHP is an HTML-embedded scripting language. Its syntax comes from C, Java and Perl with a couple of unique PHP-specific features thrown in. The language is developed to allow web developers to write dynamically generated pages quickly[5]. PHP stands *for* PHP: Hypertext Preprocessor[5].

PHP began life as a simple little cgi wrapper written in Perl. PHP is a dynamic programming language developed for web applications and comes with many capabilities including accessing database and uploading video. PHP stood beside MySQL, Eclipse, Apache HTTP Server, Apache Tomcat, and the JBoss Application Server as a dynamic language in order to build Web 2.0. As the US magazine eWeek attested, the LAMP-stack (and PHP in particular) delivers excellent performance compared to commercial alternatives such as Microsoft's .Net: "This stack's performance numbers suggest what many who have been using PHP for some time now (including some of the busiest blogs on the Web) know to be true — that a pure LAMP-based PHP system can easily handle enterprise-class traffic and loads[6].

Using PHP, it adds footer with information about the number of times your page has been accessed. PHP also serves as a form interpreter cgi. For example, information in your form needs to be processed. PHP will pass this information to another web page. To begin with PHP, user needs to install a web server, such as Apache and PHP and also a database, such as MySQL. These can be individually or choose a simpler way.

After studying many capabilities of PHP, it has been decided the MMS Based Examination Result System PHP is the most suitable as the scripting language to build the system. The system then communicates with database using MySQL. By

using PHP, it allows the system generated quickly and having the capabilities to access database and other features.

2.1.2 Short Multimedia Messaging System (SMS)

One of the functions included in mobile phone is text messaging via Short Message Service (SMS). SMS is a communications protocol allowing the interchange of short text messages between mobile telephone devices[7]. There are two SMS standards defined by the ETSI (European Telecommunications Standards Institute)[8], i.e., the SMSCB (Cell Broadcast) and the SMSPP (Point to Point):

a. SMSCB (Cell Broadcast)

One way service that deals with transmitting message to all active Mobile Stations (MS) in a network cell that have subscribed to this particular information service.

b. SMSPP (Point to Point)

Deals with sending messages from one mobile to another, or from a computer to a mobile and vice versa. These are the majority of messages stored and transmitted by an SMS Center (SMSC)[IS497, Net03, PCG00][8].

Messages are sent with the MAP mo- and mt-ForwardSM operations, whose payload length is limited by the constraints of the signaling protocol to precisely 140 octets (140 octets = 140 * 8 bits = 1120 bits)[7]. Short messages can be encoded using a variety of alphabets: the default GSM 7-bit alphabet (shown below), the 8-bit data alphabet, and the 16-bit UTF-16/UCS-2 alphabet[7]. There are few issues identified in sending text messages using SMS:

- lack of timely delivery
- no guaranteed delivery or even reliable notification of delivery
- no possibility of processing a great number of text messages in a short timeframe
- text messages stored on third-party SMSC

- low throughput of text messages

Based on the SMS issues identified, other alternatives are needed to solve the problem in sending text message using SMS. One of the alternatives is to implement MMS standard in retrieving examination result.

2.1.3 Multimedia Messaging System (MMS)

MMS is the evolution of Short Messaging System (SMS) to send and receive short text-based messages. MMS does not require 3G network because it can function under a 2G or 2.5G network. There are many differences between MMS and SMS. First, MMS is able to handle multimedia objects where it can support different messaging standards such as email. Newer delivery features like receive confirmation, read confirmation and pre-paid replies are also offered by MMS.

The WAP (Wireless Application Protocol) Forum and the 3GPP (3rd Generation Partnership Project) are the two telephony standards bodies producing specifications related to MMS messages and how they are composed and sent. The standards produced by these two bodies in turn use existing specifications from two Internet standards bodies: the W3C (World Wide Web Consortium) and the IETF (Internet Engineering Task Force)[9]. Specifications on how messages are composed and packaged are determined by the WAP Forum while specifications on how messages are sent, route and received are determined by the standards of 3GPP.

User can compose and receive MMS message on mobile phone, computer, PDA or other device that integrate MMS client. The received messages of MMS act as a slideshow where it has display area and divided to different sections. MMS messages can be divided to two sections where it display one for image and one for text. SMIL language specified the layout and ordering of the slides. The actual image, text and audio (the content of the slides) are separate pieces that will be sent along with the slides and need to be encoded with a supported format. MMS enables person-to-person mobile messaging to incorporate a mix of different media types in addition to traditional voice and text[10]:

Table 2.1 MMS Media Types[10]

Media Types	Detail
Rich text	with the ability to select and manipulate fonts and perform a range of formatting options
Colour	from 16-colours to full-spectrum and including black & white and grayscale
Icons, logos and pictograms	selected from clip-art libraries or devised by the user
Sound clips	voice clips, melodies and special effects
Full music file downloads	such as MP3
Photographs	such as JPEG
Animated graphics	such as animated GIF
Video clips	such as MPEG4

2.1.4 Advantages of MMS over SMS

Table 2.2 Advantages of MMS over SMS

Disadvantages of SMS[11]	Advantages of MMS[9]
1. Inherent design problems - Long text message will result in concatenated text message	1. Can support up to 50kB per MMS One MMS can contain two different section consist of text and images /videos/audio.
2. Limited Character 160 character per text message	2. Support images, audio, text and video in one MMS
3. Vulnerability to abuse User can modify a text message easily	3. Depends on the MMS file security feature e.g A PDF format file can include a read-only security feature
1. Inherent design problems Long text message will result in concatenated text message	1. Can support up to 50kB per MMS One MMS can contain two different section consist of text and images /videos/audio.

Advantages of MMS

1. Can support up to 50kB per MMS

One text message can support up to 50kB per MMS[9].

2. Support images, audio, text and video in one MMS. The media formats that can be supported by MMS are:

Table 2.3 Supported Media Format by MMS

Media Formats	Detail
Images	For images, these are baseline JPEG with JFIF exchange format, GIF87a, GIF89a, and WBMP. The maximum guaranteed image resolution is 160 pixels wide by 120 pixels high, larger images are supported, but need to be converted for the target device[9].
Audio	Audio should be encoded as AMR (Adaptive Multi Rate, a codec used for voice in GSM and 3G networks)[9].
Video	MPEG type video file.

3. Depends on the MMS file security feature

The user shall be able to use and access MMS in a secure manner. It shall be possible for the contents of MMS to be read only by the intended recipient(s). A recipient shall be reliably informed of the identity of the sender in case the sender has authorized his identity to be transmitted. The integrity of MMS during transit shall be assured to the extent of the network capabilities. The MMS shall be resistant to attempts of malicious or fraudulent use. The MMS shall have the ability to authenticate the user regardless of access technology. The MMS shall support data transport in a secure manner between the user and MMS. The MMS authentication scheme shall use access specific information. [12].

Disadvantages of SMS

1. Inherent design problems

A single SMS message can contain only 160 7-bit characters or 70 UCS2/Unicode[2]. Thus, a longer message needs to be conveyed in more than one SMS. This result in concatenated text messages. During the October 2007 fires in Malibu, California, Pepperdine University initially sent long emergency text messages, which were subsequently broken up into six to eight smaller components. In many cases, the messages were not delivered in order and subsequently confused the recipients[11].

2. Character limits

Another disadvantage involves the limit on message length. Because SMS messaging supports only 160 characters, messages are often necessarily cryptic. Longer messages are broken down into a sequence of 160-character messages. These long or “concatenated” SMS messages are reassembled by newer phones to accurately present the message to the reader. If the phone doesn’t support concatenation, however, sub messages sometimes arrive out of order or not at all[2].

3. Vulnerability to abuse

A text message can be edited and modified by the user. This weakness can lead to a vulnerable insecure end data.

It can be concluded that, MMS features had upgrade the limitations of SMS. With the capability to send different type of file, MMS also valid as a future reference as it has security feature and can support a large number of data.

2.2 SIMILAR APPLICATION

2.2.1 SMS-Based Information Portal for Feliciano Information System of Jose C Feliciano College (JCFC)[13]

The institutional information portal is where it provided the information on the university library, registrar, enrollment, grading and accounting. The developed SMS Based Information Portal is where it caters end users inquiries without transmitting from office to office. This system is developed using several software and hardware. For the hardware part:

a. Portal

A mobile phone is used a portal for the system. The portal will receive user enquires and respond back by sending desired information to user. It acts as a getaway of information.

b. Server

A computer act as a server in this case study. It stored all the information needed to retrieved and act as a database and web server.

c. Wireless Interface

Bluetooth is used to connect the portal with the server.

The information portal developed is comprised of SMS based system and a website. The SMS based system run in a console application and reflect different activities such as message detection, receiving message, querying message, sending message and error detection.

Users will send inquiries through the portal which connect to the server. Portal checks if the message has valid syntax. I there is no error, the query is then sent to the server and information is retrieved from the database. If there are records found, the retrieved information will be sent to user mobile phone in SMS text message.

MMS Based Examination Result System implement part of the concept used by SMS-Based Information Portal for Feliciano Information System of Jose C Feliciano College. In the SMS-Based Information Portal, user will send request to the portal for any enquiries regarding university library, registrar, enrollment, grading and accounting. The portal will communicate with the server, which stores all the information in the database. The requested information will then be sent back to user via the portal. By using MMS Based Examination Result System, user will not send the request through the portal but it will be sent to NowSMS as a getaway. NowSMS then will communicate with the system(server) which stores the

information regarding examination result. The requested examination result is then sent to user via NowSMS.

2.2.2 Exam Results on the Internet (India)

Based on the article, the emergence of the internet had transform the scenario of checking examination result where students are comfortable to check their result just a click away in their home rather than having to rummaging through notice board. The World Wide Web has been used to publish Examination Result System. Through its nationwide infrastructure present in all states of India, examination results are publish by National Informatics Centre (NIC), a part of the Ministry of Communications & Information Technology. NIC has been publishing and disseminating the results of several academic and recruitment examinations using the medium of Internet every year on the Exam Results web portal (<http://results.nic.in>)[14].

NIC had customized the software with the consultation with the concerned State Education Board in terms of the information requirement, layout, number/type of reports to be generated etc. The result data, once prepared in the digital form by the respective Board is then transported in the appropriate format on to the Results servers being maintained by NIC. To make the exam result accessible to the remotest area in India, the results are also being made available through IVRS, SMS and Email.

a. Interactive Voice Response System (IVRS)

Students need to call a given telephone number and the computer act as a operator will give the information requested. CTI (Computer Telephony Interface) software and hardware help to configure the server to accept calls.

b. Short Message Service (SMS)

Students have to type a specified message code followed by the Roll No using text message and this message is then sent to obtain the result. Results are being provided to the students through SMS on mobile phones.

c. E-mail

The results are obtained by students through their mailbox. First, they had to pre-register with the Result web portal. Results are also being sent to schools through emails on pre registration.

2.2.3 Web Services of MMS Applications on Mobile Devices

The research is based on developing a web service system that applied Multimedia Messaging Service (MMS) to mobile devices such as Personal Digital Assistant(PDA) cellular phone. The steps taken are by modeling MMS system environment and architecture. This is where a system consists of mobile host, server providers, a multimedia server and web cam is constructed as shown in Figure 1[15]. Mobile device will receive mobile pages and send multimedia message to other mobile phone or web server. Live video also been received by the PDA from web cam server. The application server was functional at port 80 and a multimedia server at port 6007 and act as a hybrid web server.

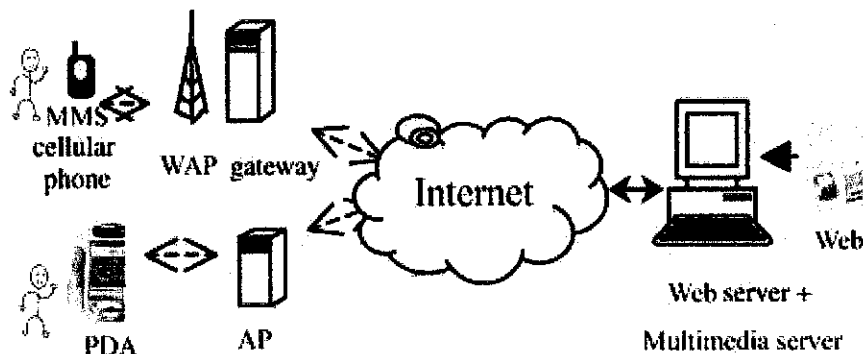


Figure 2.1 MMS application environment with mobile communication.

Next, The Web Services Description Language (WSDL) defines the operations and interface of the MMS system to represent the web services on MMS application system. Lastly, two prototype involving distance video cam monitor system and GPRS cellular phone MMS sender are described.

Vision-Receive, Message-Send, and Message-Receive are the three processes that exist between application server and mobile devices in this study. In Vision-Receive, a user can request image retrieve from web site. In Message-Send, user can send multimedia message to personal computer via MMS mail server. In Message-Received, SMS or MMS technology are implied to push mode where information is send actively by the server application to the mobile device of a user.

There are two examples given in the case study. An application server is constructed using server operation systems such as Windos2000 Server or Windos2003 Server, and application software for web pages and databases. A remote appliance monitor is established that includes a control platform MA8-6 that contains multi-type I/O interfaces, DIO, RS232 or RS485, linked to the web appliance server through GPRS protocols[15]. Several detector data are access by the appliance server and the data is then saved. The system is used for detecting earthquake, stealer and fire where user can enquire about and control the application from their mobile phone using WAP or HTTP protocol.

Based on the Web Services of MMS Applications on Mobile Devices, MMS Based Examination Result System implement the similar concept. This is where user receives MMS data from the system provided.

2.3 STRENGTH

Based on the study conducted by Fausto Colombo and Barbara Scifo[15], a research which involved 70 male and female participants ranging in age from teenagers to young adults (14 to 34 years old) has been made. This research is done on June- July 2003, a year after MMS is introduced. The participants had their own mobile phone complete colour displays and icon interfaces, built-in or optional cameras, and MMS protocols. The research seems to show how the new types of techno-social situations introduced by the forms of use of camera-phones (which are in reality closer to the preceding ones than they seem) reveal opportunities at a microsocial level for forms of spatio-temporal and social continuity supporting proximity and the sharing of experience[15]. In this case, the images taken by the participant's mobile phone camera are shared to others by using MMS as a medium

to send and receive the images. MMS can serve as a rapid, effective form of communication in the place of an SMS message or telephone call. In comparison with traditional forms of telephone communications, MMS messages are considered – especially by our youngest interviewees – to be convenient and quick to produce (just frame the shot and press a button, rather than have to spend time clicking on the touchpad as in the case of SMS messages), effective in terms of interpretation (because they overcome any form of semantic ambiguity found in the spoken or written word), succinct, and reducing the risk of being kept hanging on the telephone[15]. The research also had identified three type of visual message: performative MMS messages, informative messages and problem solving messages.

It can be concluded that MMS Based Examination Result System has many advantages that can cover the limitations of SMS examination result. MMS include more type of file rather than just text message. MMS also has higher capacity of size per message. It also can be stored to other storage devices such thumb drives and disc.

CHAPTER 3

METHODOLOGY

3.1 SPIRAL LIFE CYCLE MODEL

There are some procedures to be followed in order to carry out and implement the project using Spiral Life Cycle Model[16]. This is to ensure that the project can be accomplished within the given timeframe.

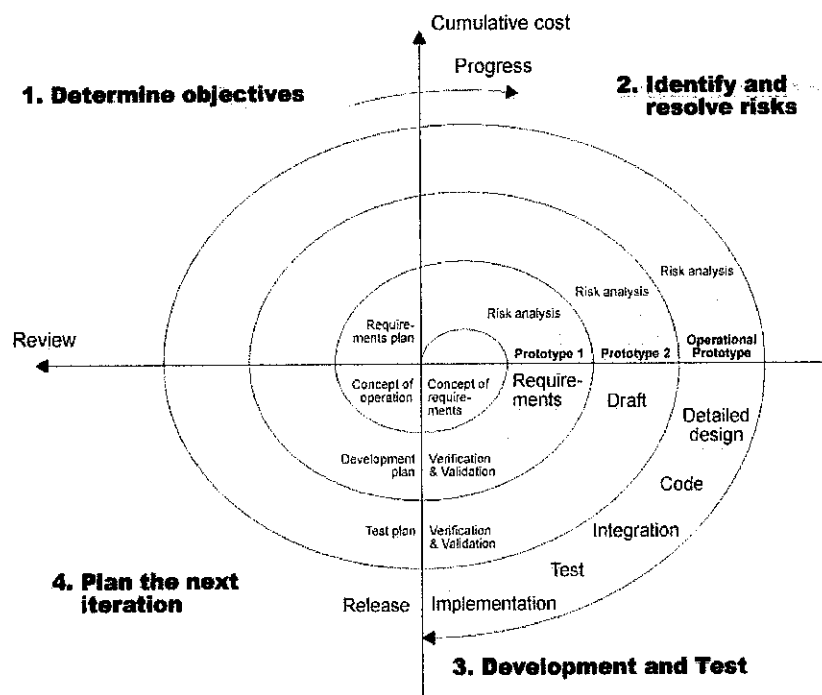


Figure 3.1 Spiral Life Cycle Model

The steps that are involved in Spiral Life Cycle Model [17] that relates to this project are:

1. System requirement for the system is determined as detail as possible. Some survey and interview is conducted in order to meet user internal and external expectation and other aspects from existing system.
2. Design draft feature for the system is created.

3. A first prototype been enhanced from the draft of the system is created. This is usually a scaled-down system, and represents an approximation of the characteristics of the final product.
4. A second prototype evolved from the first prototype created following some procedure:
 - evaluating the first prototype in terms of its strengths, weaknesses, and risks;
 - defining the requirements of the second prototype;
 - planning and designing the second prototype;
 - constructing and testing the second prototype.

3.2 TOOLS

Table 3.1 List of Hardware and Software

Hardware	Personal Computer (Acer TravelMate 3210)
	GSM Modem (Sony Ericsson W800i/W700i) with SIM Card attached
Software	Now SMS/MMS Getaway
	Macromedia Dreamweaver
	MySQL Server 5.0

3.2.1 NowSMS

NowSMS is a middleware tool which simplifies the process of connecting to one or more of these service providers and/or managing one or more GSM modems. The NowSMS is an SMS and MMS Content Delivery Solution. NowSMS is a fast track to deploying and developing SMS, MMS and WAP Push solutions.

3.2.2 Macromedia Dreamweaver.

Tools that act as a platform to develop the system interface and to insert programming code such as PHP and HTML in order to make the system function.

3.2.3 MySQL Server 5.0

Create the database for MMS Based Examination Result System. The database store student's examination result.

3.3 PROJECT MILESTONE

Table 3.2 shows the project milestones throughout development life cycle. Refer to Appendix A for project Gantt chart for Final Year Project 1 and Appendix B for project Gantt chart for Final Year Project 2.

Table 3.2 Project Milestone Schedule

Project Milestones	Date
Proposal	20/01/2009
Proposal Approval by Research Cluster	28/01/2009
Project Initiation	01/02/2009
Seminar 1 - Preliminary Reporting	20/03/2009
Progress Report	30/03/2009
Seminar 2 - Progress Reporting	02/04/2009
Interim Report	18/04/2009
Oral Presentation - Final Reporting	22/04/2009
Submission of Progress Report 1	08/08/2009
Submission of Progress Report 2 (Final Draft)	09/09/2009
Seminar - Progress Reporting	14/09/2009
Poster Exhibition (Pre-Edx)	07/10/2009
Submission of Dissertation (soft bound)	12/10/2009
Oral Presentation	28/10/2009
Submission of Project Dissertation (Hard Bound)	16/11/2009

CHAPTER 4

RESULT AND DISCUSSION

4.1 SERVER DESIGN SCHEME

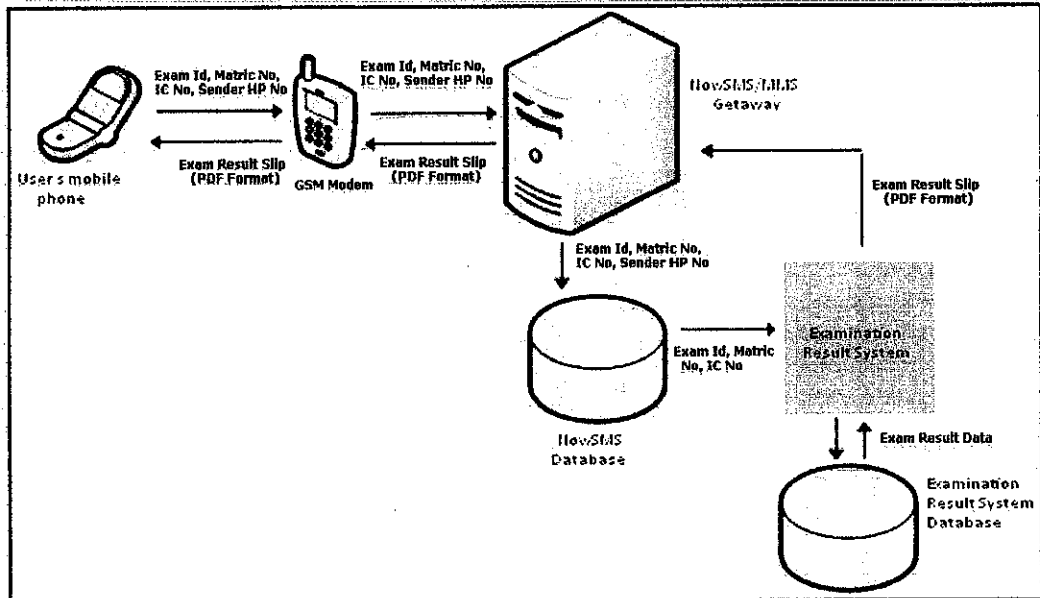


Figure 4.1 MMS Based Examination Result System Architecture

To retrieve MMS examination result slip, SMS is sent using mobile phone to a default number provided by the system. This SMS contain a student's matric number, examination id and IC number. This SMS then receive by NowSMS gateway in order to extract the information in the SMS. Beforehand, the SMS pass through the GSM phone connected to the PC where it acts as a modem to the system. The data extracted from the SMS (matric number, examination id and IC number, sender's mobile number) is saved in NowSMS database table.

Next, NowSMS database interact with the Examination Result System to retrieve the student's examination result based on the matric number, examination id and IC number. The Examination Result System stores the student's result information in a separate database (ExaminationResultSystem). The student's result information will be then retrieved from the database to the system. The system

validates the data send by the users by comparing the data extracted from the SMS with the student's information from the ExaminationResultSystem database. The systems then convert the information into a PDF format examination result slip. This file then goes through NowSMS in order to send the examination result slip (PDF) in MMS format to user's mobile phone.

Table 4.1 Architecture Entities Description

User Interface	The system does not require building a user interface. Users can interact with the system solely by sending text messages from their standard mobile devices to the specified number. Text messages will be transmitted through overlaid GSM Networks.
GSM Modem	GSM Modem equipped with a SIM card receives the text messages (sent by users) and passes the messages to the server. GSM Modem and server are connected through data cable connection.
NowSMS/MMS Gateway	Acts as an interface between GSM Modem and the server itself. It also converts the messages from PDU into text mode and stores the messages into the database. Every SMS Gateway available in the market has its own attributes and design. For this system, developer is using NowSMS Gateway which is available as freeware. It fetches messages from GSM Modem and stores all incoming and outgoing messages to a database called NowSMS. Information on installation procedures and configurations for NowSMS Gateway is attached on Appendix C.
Database	The database stores all required information that can be manipulated from any programs using SQL statements.
PHP Programs	PHP programs do all processes to complete the whole cycle of the system from message retrieval to message reply. Explanation of each program will be discussed later in this chapter.

The complete model of the system is described in using UML Diagrams attached in the Appendices. The diagrams that are being used are:

4.1.1 System Flowchart

A system flowchart explains how a system works or process showing the steps and their order by connecting arrows using a diagram. The diagram shows the flow of data through MMS Based Examination Result System. (Refer to Appendix D).

4.1.2 Use Case Diagram

Its purpose is to present a graphical overview of the functionality provided by a system in terms of actors, their goals (represented as use cases), and any dependencies between those use cases. Actor represents a person or a system that derives benefit from and is external to the subject[19]. Use case represents a major piece of system functionality[19]. The main purpose of a use case diagram is to show what system functions are performed for which actors. Roles of the actors in the system can be depicted. (Refer to Appendix E)

4.1.3 Data Flow Diagram

This view presents the users perception of the functionality and graphical representation of the "flow" of data through an information system. Context diagram and data flow diagram contains a set of external entities, process entities, data flow and data store.

Context level diagram is drawn first to show the interaction between the system and external agents which act as data sources and data sinks. The context diagram shows the entire system as a single process, and gives no clues as to its internal organization. (Refer to Appendix F).

Then, this context level explodes to produce Level 1 DFD that shows some of the detail of the system being modeled. The Level 1 DFD shows how the system is divided into sub-systems (processes), each of which deals with one or more of the data flows to or from an external agent, and which together provide all of the functionality of the system as a whole. It also identifies internal data stores that must

be present in order for the system to do its job, and shows the flow of data between the various parts of the system[20]. (Refer to Appendix G).

4.2 DATABASE DESIGN SCHEME

MySQL database server is used to implement the database for this project. Two databases will be created: NowSMS database and ExaminationResult.

4.2.1 NowSMS Database Design

This database is created in order to record the message received and sent by NowSMS. It has one table, 'inbox' for incoming messages. If SMS message is received, NowSMS gateway will interact with the SQL script that has been defined in the Examination Result System. The message and the sender's mobile number are extracted from the SMS. These data is then inserted into the 'inbox' table. The SQL script that triggers the insert statement are as below.

```
$sql = "INSERT INTO inbox SET id=", sms='$sms', hp='$hp';";
```

The message sent is inserted into 'sms' field while sender mobile number is inserted in 'hp' field. These records are passed to the Examination Result System programs for further process. The NowSMS database tables are shown in Figure 1.6 below.

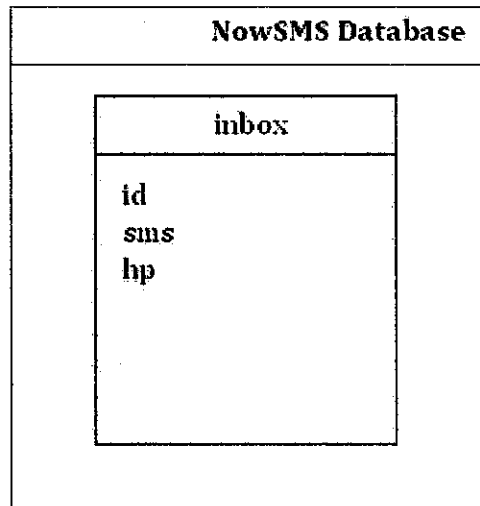


Figure 4.2 NowSMS Database

4.2.2 ExaminationResult Database Design

This database is connected to the prototype Examination Result System in order to retrieve student's examination results. There are three tables; Student, Course and Result. The table 'Student' stores the student's details such as exam id, IC number, matric number, studying session, name and programme. The data extracted from the SMS sent by users are compared to the student's data in 'Student' table in order to retrieve the correct result respectively to each student according to their matric number, examination id and IC number. The SQL script that compares the SMS data with the actual student's data is as below.

```

$query_ViewStudent = "SELECT * FROM result r, student s WHERE
                    r.ExamID = s.ExamID AND s.ExamID = '$EID' AND
                    s.MatricNo = '$MNo' AND s.ICNo = '$IC' ";
  
```

The 'Course' table stores data for each courses offered by the university. Details for each course are stored in this table such as course code, description and credit hour for each course.

The Result table stores each student's examination result. The examination result details are student's exam id, course taken for that respective semester, course description, credit hour for the courses, grade for each course, credit point for each course, semester credit pass, semester point, GPA, CGPA, accumulated pass, accumulated point and result for each student. This table is correlated with 'Course' and 'Student' table because 'Result' table contain the courses taken by each student and the student's exam id as its primary key. The database will be enhanced to obtain full capabilities of the system for further enhancement. The design of the database is depicted in Figure 4.3.

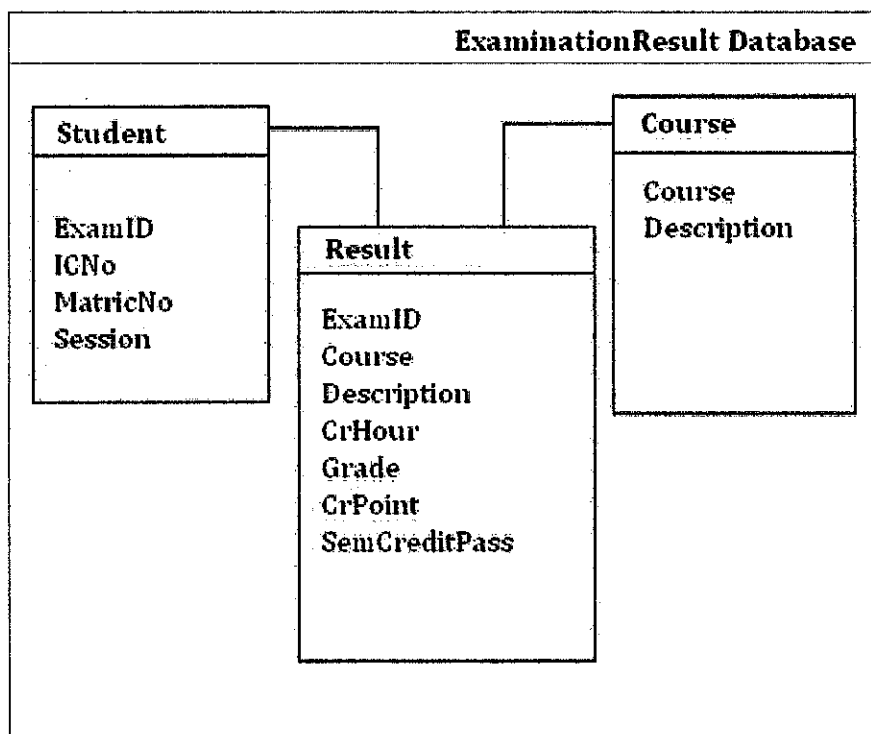


Figure 4.3 ExaminationResult Database

4.3 PROGRAM DESIGN SCHEME

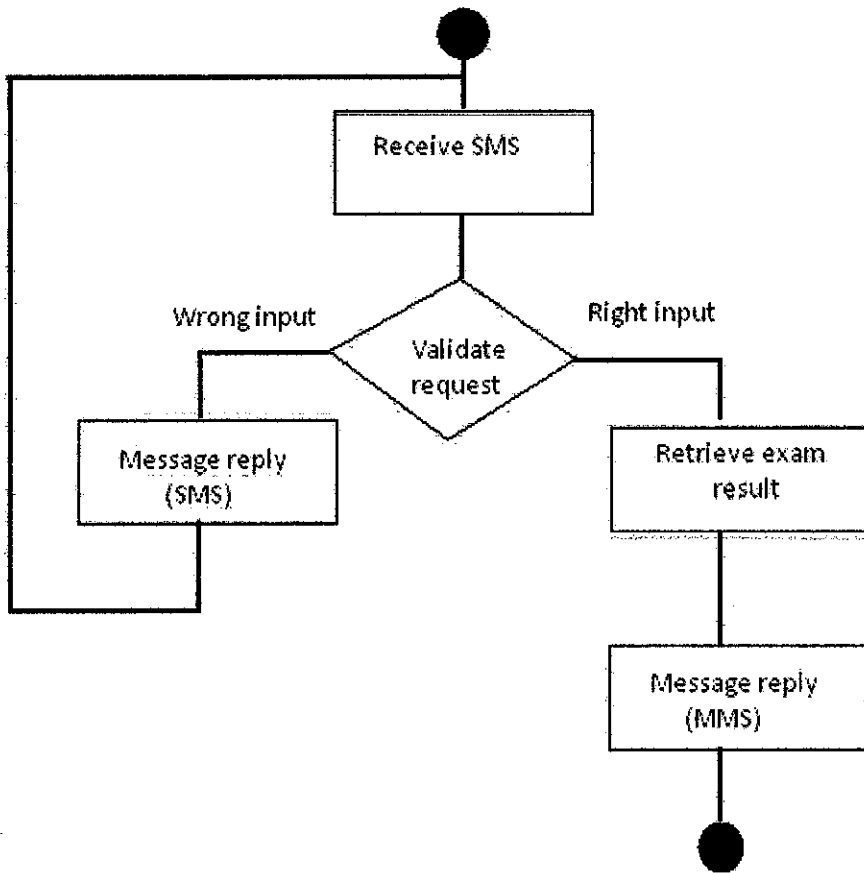


Figure 4.4 MMS Based Examination Result System Program Flow

4.3.1 Receive Message

The program starts for every incoming SMS received by the NowSMS gateway. Each of the messages received will be inserted into the 'inbox' table in NowSMS database. To know when the incoming messages arrive, a notification script was created. This script notifies the latest updates in the 'inbox' table. When there is an incoming message, the program will fetch the latest message and pass it to other respective program. The program flow is shown in Figure 4.4.

4.3.2 Request Validation and Extraction

The SMS send by users must follow the predetermined format as follows:

SEND<space>MATRIC NUMBER<space>EXAM ID<space>IC NUMBER

The message send by user is trimmed into pieces of data; matric number, examination id, IC number and sender's mobile number. These data are then validated by comparing each data with the existing student's data in the ExaminationResult database. If wrong input was inserted by user, the program execute the script to send notification SMS to the user. The program will continue to next process if right input was entered by the user.

4.3.3 Retrieval of Examination Result Slip

Based on the validated matric number, examination id and IC number, the program retrieved student's examination result data from the ExaminationResult database. The data retrieved is organized into a formatted examination result slip. After the process, the organized examination result slip is converted into a PDF format file. The PDF file is stored temporarily in a 'temp' folder in the system destination file. This PDF file will be deleted once there is another PDF file created.

4.3.4 Message Reply Execution

After the PDF file was created, a reply message should be sent to the respective user. The program will execute the script to send MMS message to user based on the mobile number received earlier. The MMS message will contain the PDF file from the 'temp' folder. Then the NowSMS gateway will automatically send the message through GSM Modem attached to the server.

4.4 SYSTEM PROTOTYPE

MMS Based Examination Result System is developed as the end result prototype with the scope that has been defined earlier. In order to start the system, these steps need to be taken:

1. Start NowSMS getaway SMS and MMSC service by clicking start (assuming all the configuration steps has been done before).

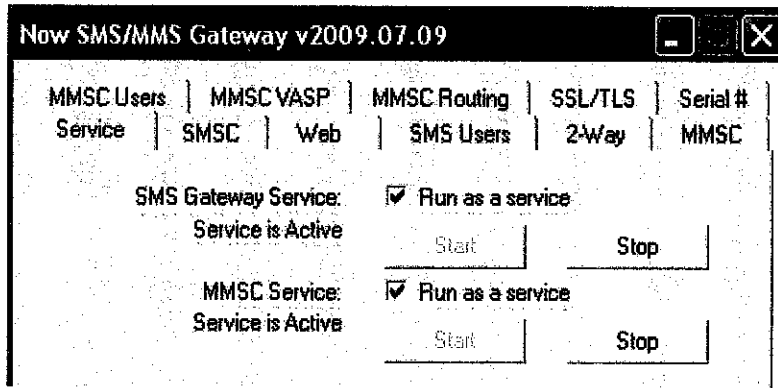


Figure 4.5 NowSMS Gateway

2. Assuming that the devices are on, connect laptop with GSM Modem via data cable.
3. Send an SMS to the modem number. The sample request is shown in Figure 4.5 below.

Table 4.2 Sample User's Request

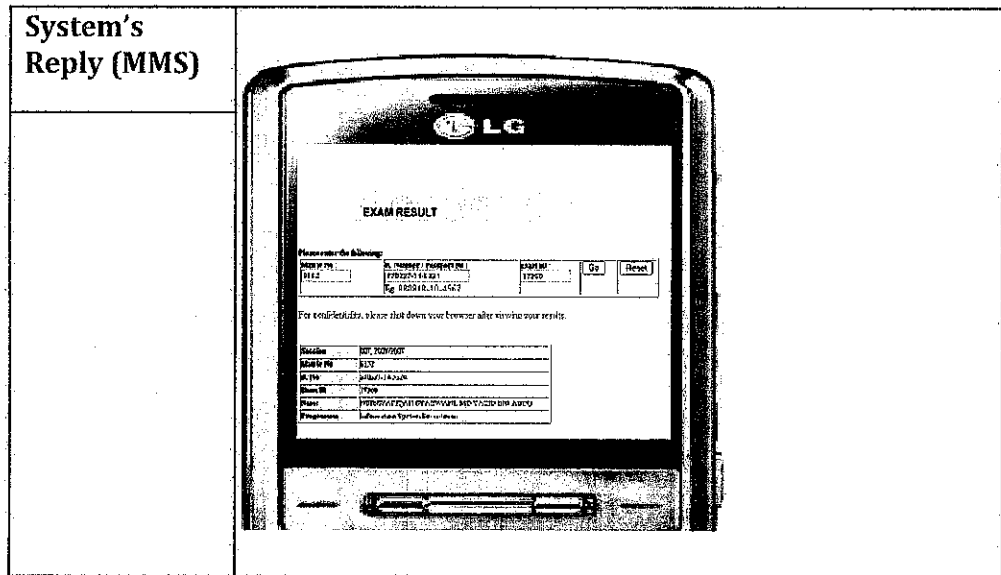
User's Request (SMS)	
----------------------	--

From the table, it shows example of user's request SMS format to send to NowSMS gateway in order to retrieve the examination result slip. The format to send the SMS is

SEND<space>MATRIC NUMBER<space>EXAM ID<space>IC NUMBER

The MMS examination result slip will be viewed in PDF format using Adobe Reader application in user's mobile phone. The size differs depends on the size of the mobile phone's screen. Usually, a full examination result slip will take 2 pages in order to view the whole slip.

Table 4.3 Sample User's Examination Result Slip Reply(PDF)



4.5 SYSTEM EVALUATION

Over 30 tests in the system testing, the system faced several errors. Even though the percentage of error is minor, author expects to eliminate the error to its minimum level. The result of the testing is depicted in the chart below.

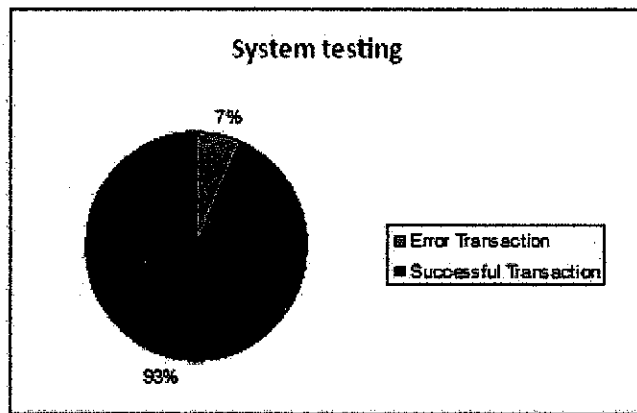


Figure 4.6 System Testing Transaction Ratio

The defects of the system are mostly in the NowSMS gateway services which do the receiving and sending message to user. Possible limitations of the system are:

1. WAP gateway cannot be access for sending MMS to user.
2. The system needs a stable internet network connection.
3. User entered wrong input thus trigger the SMS notification.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

UTP only implemented online system for students to check their examination result. On 2004, a project called Retrieval of Final Exam Result via SMS had been created by final year student in order to make examination result viewable by SMS. The SMS examination result has limitations to users such as its limited capacity of only text message and also higher risk of losing the data because of storage space issues in user's mobile inbox.

After further study and system development, it can be concluded that the MMS Based Examination Result System is able to retrieve a graphic view of an examination result slip through user's mobile phone thus giving the capability to store and print the examination result slip in other devices.

Spiral Life Cycle Model methodology is the software development to develop the system. The tools used for this project are personal computer (Acer TravelMate 3210), GSM Modem (Sony Ericsson W800i/W700i) with sim card attached, NowSMS/MMS Getaway, Macromedia Dreamweaver 6 and MySQL Server 5.0.

The end product of this project is MMS Based Examination Result System prototype whose scope has been defined earlier. Over 30 tests in the acceptance testing, the system acceptance ratio is 93% due to accurate reply generated by the system.

5.2 RECOMMENDATION

For future improvement, there are some recommendations that should be made on the next study of the system:

1. Increase the scope of study by including the retrieval of every semester examination result.
2. Provide more security features for the MMS received by students.
3. For actual implementation of the system, there should be an allocated server to provide processes and database. There should also be an allocated phone number to the system. The project initiator might want to work with a service provider to provide SMSC for the system so there will be no limitation on the traffic.

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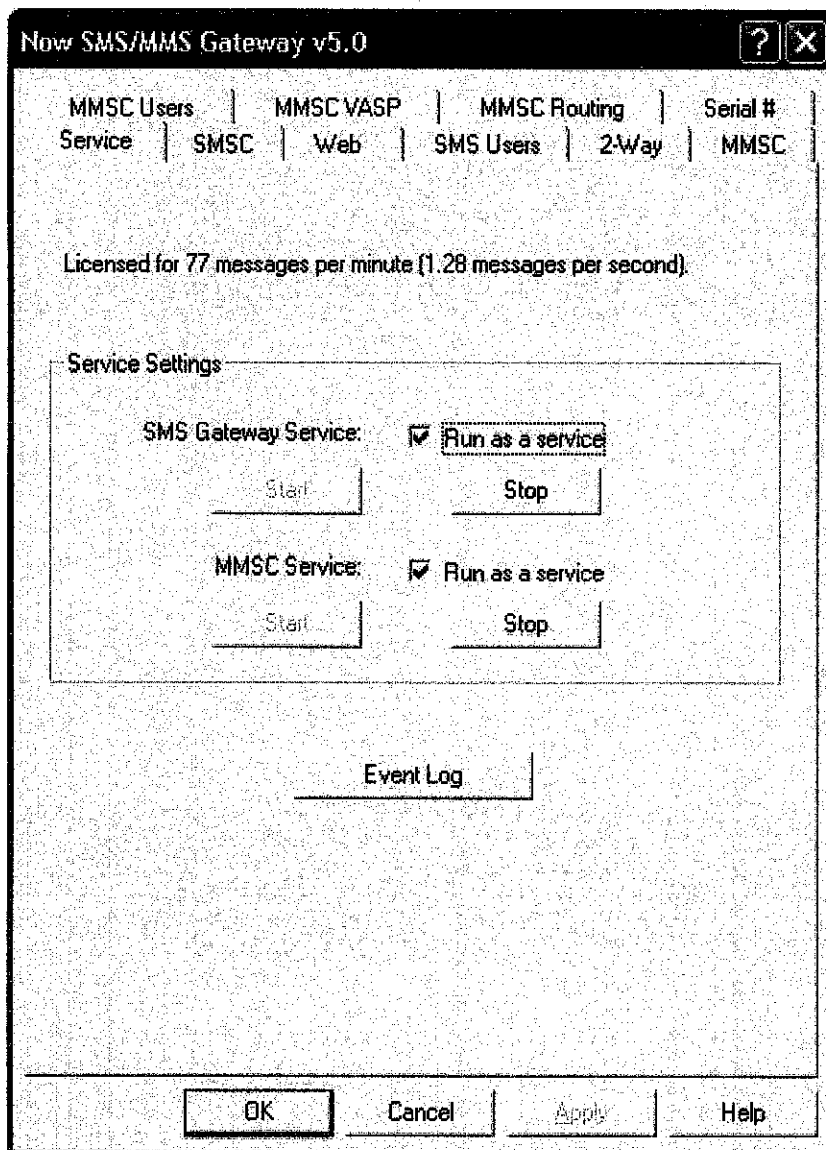
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APPENDICES

APPENDIX C: SMS GATEWAY CONFIGURATION[21]

1. Download NowSMS/MMS Gateway from <http://www.nowsms.com/downloads/> and install by clicking setup.exe file and follow the instructions.
2. After the installation finishes, configure the gateway by clicking "Yes" to install and activate the service.



NowSMS Getaway Service Configuration Window

3. To define which modems are to be utilized by the gateway, select the "SMSC" tab

from the gateway configuration dialog. Select **"Add"** and then **" GSM Phone or Modem "** to display a list of available modem drivers on your computer. Select an available modem and press the **"Test and Add Modem"** button. The gateway will then attempt to initialize the modem, and confirm that the modem supports the necessary interfaces to send and receive SMS messages. After the Modem is added, there are additional Properties that can be configured for the modem connection.

- The MMSC supports sending MMS messages between mobile phones, and also

supports sending and receiving MMS messages between mobile phones and standard internet e-mail systems. The "MMSC" configuration tab specifies general configuration information for the MMSC as below:

Now SMS/MMS Gateway v4.0

Service	SMSC	Web	SMS Users	2-Way
MMSC		MMSC Users		Serial #

Activate MMSC Service

HTTP Port Number:

SMTP Port Number:

IP Address:

Local Host Name or IP Address:

Domain Name for MMS E-Mail:

SMTP Relay Host:

Enable Dynamic Image + Audio Conversion

Enable E-Mail WAV to AMR Conversion

Enable E-Mail BMP to JPEG Conversion

Enable E-Mail to SMS Support

Domain Name for SMS E-Mail:

Max SMS messages per e-mail:

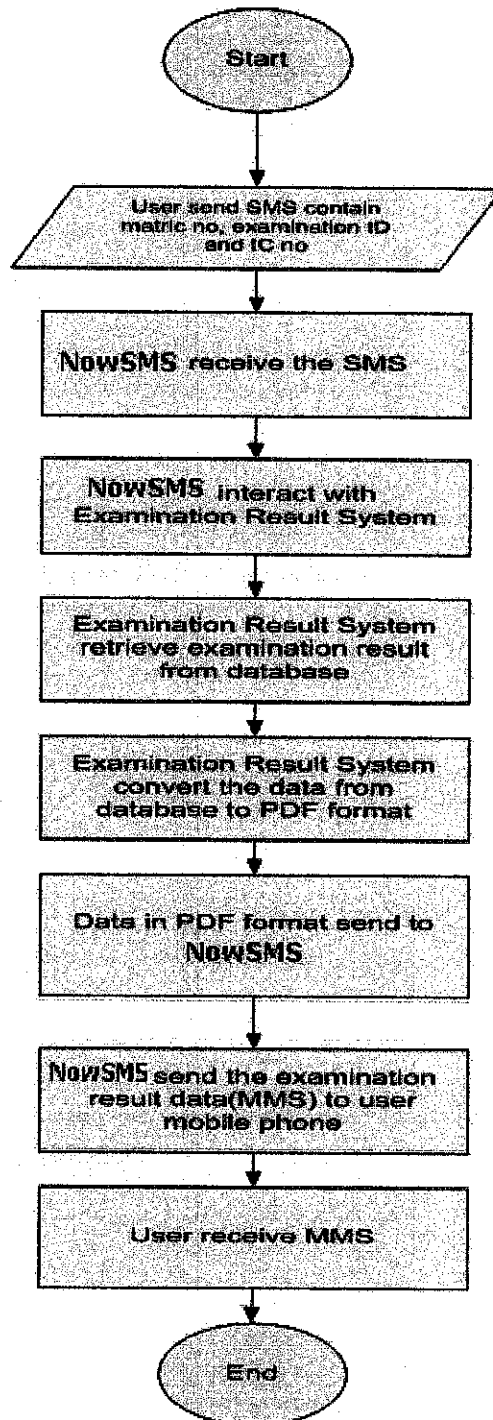
Admin User:

Admin Password:

NowSMS Gateway MMSC Configuration Window

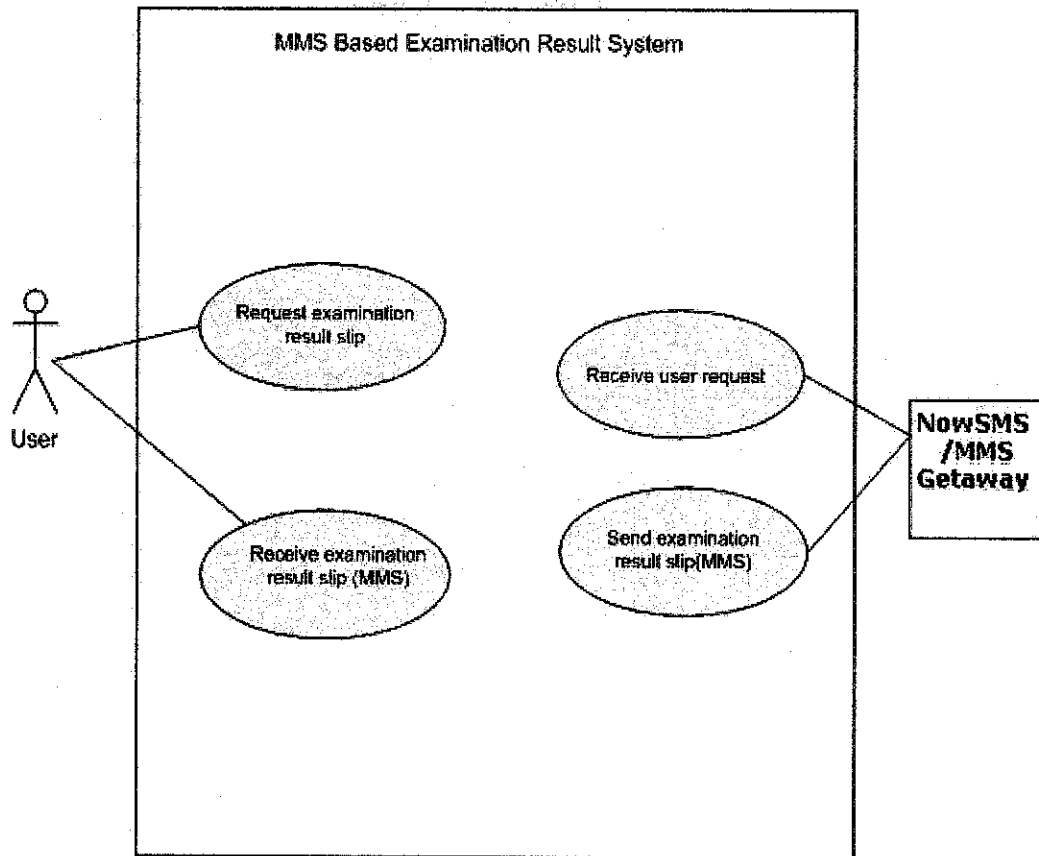
APPENDIX D

System Flow for MMS Based Examination Result



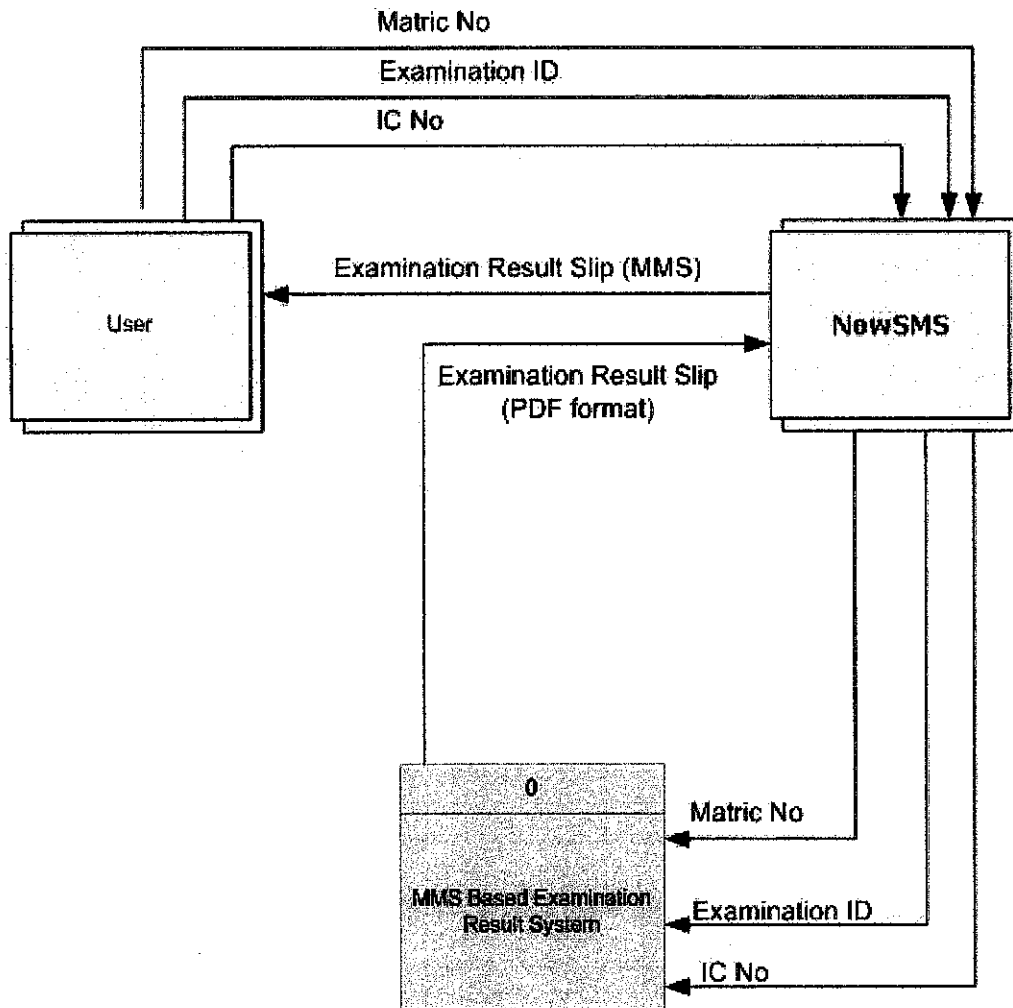
APPENDIX E

Use Case Diagram for MMS Based Examination Result System



APPENDIX F

Context Diagram for MMS Based Examination Result System



APPENDIX G

Data Flow Diagram for MMS Based Examination Result System (Level 0)

