Wireless Controlled Information Display Unit (w-CIDU)

By

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10518

Dissertation submitted in partial fulfilment of

the requirements for the

Bachelor of Technology (Hons)

(Information and Communication Technology)

MAY 2011

Universiti Teknologi PETRONAS

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CERTIFICATION OF APPROVAL

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A project dissertation submitted to the

Information and Communication Technology Programme

Universiti Teknologi PETRONAS

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(INFORMATION AND COMMUNICATION TECHNOLOGY)

Approved by,

_____

(Mr. Low Tan Jung)

UNIVERSITI TEKNOLOGI PETRONAS

TRONOH, PERAK

May 2011

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.

HING RATANA

ABSTRACT

The purpose of the project is to develop modern web-application that receives and publishes users' messages via wireless infrastructures. Users are able to update their messages wirelessly using Wi-Fi or SMS means. The proposed system has finally been done within the time frame given.

This report will describe how the project has been done within the period of about one year. There are five main chapters that will be covered in this report which are: INTRODUCTION which will introduce to a propose project with a problem statement and objective of the project, LITERATURE REVIEW which will show the significant and study of its related works of a proposed system, METHODOLOGY of how to develop this project for the timeline given, RESULT AND DISCUSSION of the finding from data that have been gathered then include with the analyzing of those data to come up with a proper solution for a system develop life cycle, and lastly is CONCLUSION AND RECOMMENDATION chapter which will summarize the overall project work with a recommendation of future work enhancement.

ACKNOWLEDGEMENT

Firstly, I would like to express greatest gratitude to my supervisor, Mr. Low Tan Jung for his support and guidance during my final year project one and two. I would like to thank my beloved parents Mr. Hing Sarouen and Ms. Tach Vira as well as my siblings for their endless supports and loves throughout my studies in UTP. Moreover, I would like to dedicate respectful thanks for i-GEN fund of Universiti Teknologi PETRONAS that provide me some money to buy all necessary equipments for the project.

I would thank to all FYP committee members for all the hard work and to all the lecturers who supported and spent their time guiding me for all these semesters. Many thanks to all my friends for making this my university life as well as this final year project a memorable experience. Finally, I wish Universiti Teknologi PETRONAS all the best in the future for becoming the leader in technology education and centre for creativity and innovation.

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ABBREVIATIONS AND NOMENCALTURES

w-CIDU: Wireless Controlled Information Display Unit

SMS: Short Message Service

GSM: Global System for Mobile Communication

API: Application Programming Interface

DBMS: Database Management System

IDE: Integrated Development Environment

GUI: Graphical User Interface

FYP: Final Year Project

UTP: Universiti Teknologi PETRONAS

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

The idea of w-CIDU is to develop modern web-application that will be able to receive and publish users' messages via wireless infrastructure. Moreover, the users are also able to update their messages wirelessly using Wi-Fi or SMS means. Because of the challenges and complexity of the project, I would like to take this project as my final year project, and I will develop three main windows with full functionality called Client Window, User Window, and Admin Window.

Client Window is the client-side graphical user interface that allows the public to see the real-time messages delivery, user registration, user login, and some information about the system.

Secondly, User Window is a simple graphical user interface that allows users to manage their SMS or messages very easily. Users are able to post new messages, delete a message, and delete all messages. They are also able to edit their account setting information and see some information that locates at the help button.

Thirdly, Admin Window is also very simple graphical user interfaces that allows system administrator to fully control all the messages and users inside the system. Administrators can post messages, delete other user messages, delete user account information, and add or register users. Additionally, administrators are also able to change his/her account setting by click on My Account Setting button.

The important of the system is all about fast and efficient messages delivery, and its availability. Fast and efficient messages delivery means public people are able to see the real-time and up-to-date information on the screen. And there are two ways to access the system. First one is wireless using Internet or Local Area Network. Users are able to access the system via wireless or LAN network to post the messages for free. Users also can put his/her hand phone number inside the system so that he/she is able to send SMS messages using his/her hand phone, and the messages will automatically delivered on the Client Window screen.

Below is the draft idea of how the whole system works. Figure 1.1.1 is the system schematic of Wireless Controlled Information Display Unit.
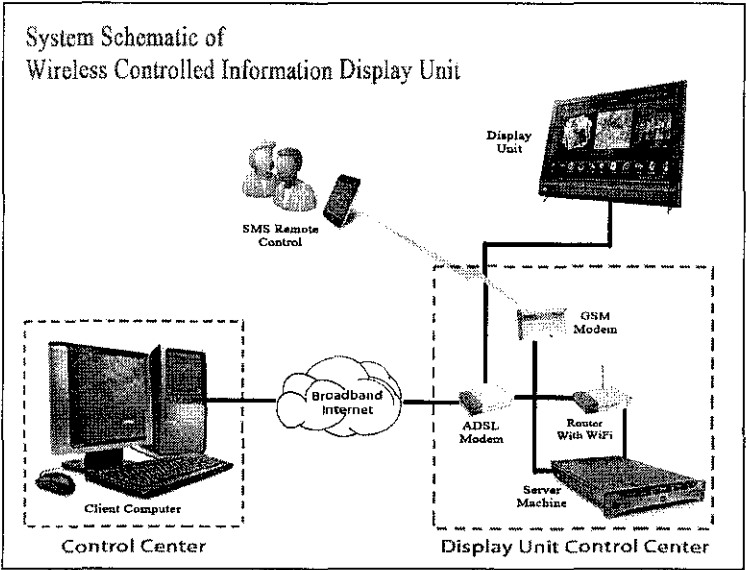
Figure 1.1.1: System Schematic of Wireless Controlled Information Display Unit

According to the architecture above, there are four main sections that present the whole system. First is display unit control center, second is control center, third is display unit, and fourth is SMS remote control.

Firstly, display unit control center is basically the main server that attached to wireless router and GSM modem. The server is running Apache Tomcat, which is the free open source server software that allows the programmer to run Java Server Page inside it. Apache Tomcat is a stable package from Apache, the most famous open

source server software in the world. The high capacity of the server will be able to handle with many users at time. The server machine would cost expensive depending on the ability and branch of the machine itself. If the project is planned to handle thousand of people, the server machine is expected to be high capacity, but for the purpose of project prototype, server machine can be at a proper capability, which should be enough to run the server. The router is to publish wireless transmission to all devices that are connected to it. Router has ability to assign fix IP address to the server, and it also has DHCP to automatically assign IP address to any device connected to it. And GSM modem is a device that is using to communicate with GSM technology that allows programmer to send and receive SMS. In order to make GSM modem to work, telephone SIM card has to be putted inside the device and attach it to the server computer.

Secondly, control center is the computer terminal that the administrator used to connect to the system. Control center could be computer, hand phone devices or any device that has capability to run web browser, and wireless enabled. These devices should be able to access the system already. The devices are connected to the server via wireless transmission. After the administrator login into the system, he/she is able to control all information inside the system.

Thirdly, the project is mainly focus on touch screen computer as the terminal to display messages to the public. Touch screen computer is a complete computer system that is able to run web browser and access to wireless signal. Display unit must accept the wireless connection that the router publishes in order to create Local Area Network. After the connection is established, the browsers are able to access to the web server, which is located in the server machine.

Finally, SMS remote control can be hand phone devices, which are able to send and receive SMS. The hand phone must be able to accept the connection from service provider. In Malaysia, there are few telecommunication service providers such as Digi, Maxis, and so on. The SMS will send using GSM technology in order to deliver messages to the server.

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After understanding the overall concept of the system structure, this section is give some study detail and information about developing website using Java technology.

The Java 2 Platform, Enterprise Edition (J2EE) defines the standard for developing multitier enterprise applications, and it also simplifies enterprise applications by basing them on standardized, modular components, by providing a complete set of services to those components, and by handling many details of application behavior automatically, without complex programming [1]. Java technology will be used to develop this project because it provides capabilities to handle multitier enterprise application. There are four main layers under enterprise application model such as client-side presentation, server-side presentation, server-side business logic, and enterprise information system.

Figure 1.1.2: Enterprise Application Model

Java technology provides tremendous and awesome enterprise development for the web application software. As in the Enterprise Application Model, there are four layers that are consisted such as client-side presentation, sever-side presentation, server-side business logic, and enterprise information system.

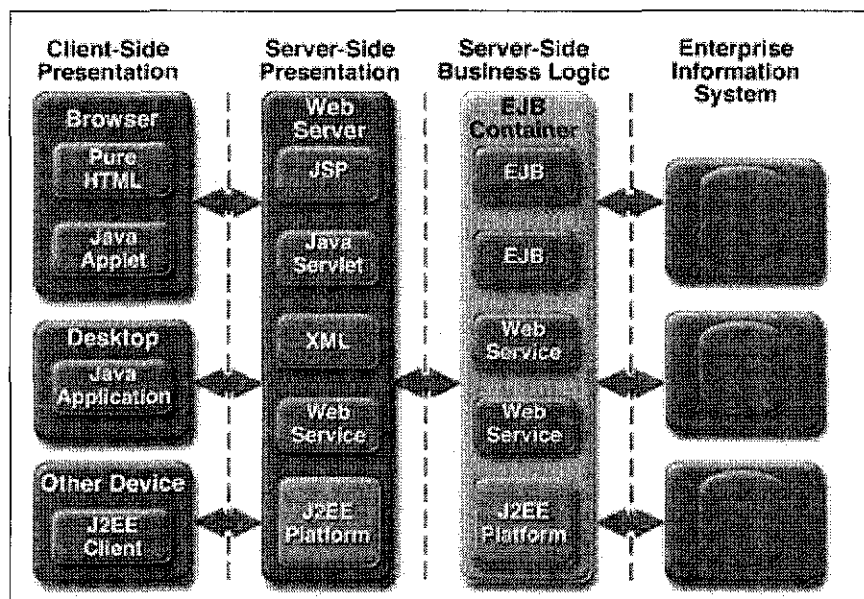Client-side presentation, simply speaking, is what the users see in the web browser, desktop, or other devices. There must have application software that is running on

the client computers. All these software must be able to talk to the server, and it must also use Java technology.

Server-side presentation consists all JSP, Java Servlet, XML, Web Services, and J2EE platform. All these files play very important role in how to make the software works. The JSP and Java Servlet are written in Java programming language.

Server-side business logic is basically Enterprise Java Bean. Java beans are small piece of Java component that hold the data. These data can be processed and moved around inside the system. EJB also allows programmer to send the data and save inside the database.

Enterprise information system is simply called database that stores million of records. Data and information is the main capital to the businesses. There are many type of database that is available in the market today. Just for enough for the project development in this document, MySQL database is a very good and open source database that can be used for the project. If talking about it functionality in the Enterprise Application Model, database is just to store all the information that are required for the business processes. This database can be accessed by EJB in J2EE development.

Another technology that we are going to study is Vaadin framework. Vaadin framework is a Java API that allows developers to develop modern web-application using Java programming language. Vaadin framework is open source and can be used for free. The website for Vaadin framework is http://vaadin.com

In order for me to manage my MySql database, I have installed XAMPP software package. XAMPP software package can be downloaded for free under http:// www.apachefriends.org/en/xampp.html .
The package will come with phpMyadmin, which is friendly DBMS user interface that allows us to easily manage our database system.

Ozeki SMS Gateway is a software package that allows connectivity between GSM modem and computer. Ozeki can be downloaded from http://www.ozeki.hu/

This software also allows connectivity to MySql database so meaning all the receive SMS messages will be stored inside the database.

Finally, we need IDE software to write our JSP files. There are many IDE available such as Netbeans IDE and Eclipse IDE. In this case, I am using Eclipse IDE for my project development because I found it useful and friendly GUI.

1.2 PROBLEM STATEMENT

1.2.1 Problem Identification

Currently, Wireless Controlled Information Display Unit system does not exist yet in Universiti Teknologi PETRONAS. The system is totally built from scratch. The problem identification can be divided into two main critical parts. Those are technical and non-technical problems.

The main problems with Wireless Controlled Information Display Unit system are due to the following:

- **Technical Problems:**

There are two main categories under technical problems. Those are hardware and software. For the hardware of the project, it consists of client computer, ADSL modem, wireless router, GSM modem, server machine, remote control, and display unit. Client computer can be individual computer in the office, who has permission access to the server. Anyhow, ADSL and wireless router can be used to transmit data from the server to the client, and GSM modem is the device that can send or receive SMS between computer and mobile device. Finally, display unit is a computer terminal that displays all required information on the screen. This project is required some budget to buy these hardware tools.

Secondly, the project also involves in the software part. The software can be a middleware that stands between GSM modem and the operating system. We can use Nokia mobile phone as GSM modem so that Nokia PC suit application is required to

make a connection between mobile phone and computer. After that, we also need Ozeki SMS server in order to send or receive SMS from the GSM modem.

- **Non-technical Problems:**

During project development, non-technical problems could be existed such as short period of time to develop the project, no enough budget to buy all equipment tools or software, and developer has no enough skill to develop the project.

When it comes to the final semester of FYP, the critical part is to write dissertation and technical report. Dissertation and technical report need a very good writing skill that we have learnt so far in UTP. English is very important for us to write the report. To me personally, writing a good report is very difficult so that I need some advice from my lecturers to improve on that.

1.3 OBJECTIVES AND SCOPE OF STUDY

1.3.1 Project Objectives

The main objectives of Wireless Controlled Information Display Unit system are:
- To develop a web-based application that allows system administrator to remotely control all information that is displayed on the display unit.
- To develop a web-based application that allows system users to remotely control all their information that they have been posted into the system.
- To provide fast and efficient message delivering from user mobile phone.
- To provide fast delivery of interactive and attractive Graphical User Interface (GUI) monitoring of web-based Wireless Controlled Information Display Unit system with real time controlling and monitoring using Java technology.
- To develop a web-based Wireless Controlled Information Display Unit system with platform independent.
  - As technology in the World Wide Web keeps advancing forward every time, web-based Wireless Controlled Information Display Unit system will be able to run from any platform including Windows,

MAC OS, Linux, Unix, or Lotus as long as the computer has an internet connection.

- To provide a dynamic web-based Wireless Controlled Information Display Unit system with customizability and security features.
  - Web-based Wireless Controlled Information Display Unit system will become customizable with its interface according to industry or company and it will be enhanced on security features.

There are three main windows that are developed for the system such as Client Window, User Window, and Admin Window. Functionalities are existed inside the windows itself. So the main functionalities of the system will be projected as the following:

- Client Window:
  - SMS Announcement: its function is to display messages in table form and users are able to click on the table row, the popup window will popup with the messages detail, lecturer name, and message delivery time.
  - Register: it contains user information boxes for users to fill in that information. After fill in all the information, user can send the information to administrator to approve on the registration
  - Login: this function allows users or administrators to login into the system. If user login into the system, they can manage and update all their messages. If Administrator login into the system, they are able to manage very thing inside the system such as messages, user accounts, phone numbers, and SMS messages.
  - About This App: this function is just to provide some information about the project, which are involved, project idea, and its support.
- User Window:
  - All Messages: its function is to display all the messages that users have been posted into the system.
  - Add New Messages: this is to add new message into the system.
  - Delete Message: it is to delete message that use desire to do so.

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- o Delete All Messages: it is to delete all user messages that consisted inside the system.
- o My Account Setting: it allows users to change their personal information details.
- o Logout: this button allows users to logout from the system.
- o Help: provides necessary help information for user to use the system
- o About This App: just to show the version about the system.
- Admin Window:

   Because administrator is a super user of the system so admin has more functionality to control the system compared to system user. There are three main tab control function all together.

   - o All Messages (Tab 1)
     - This tab control has the functionality the same as user level. Admin is able to post, delete, and delete all messages. This level of control is the same as the user level of control that has been described in User Window above.
   - o All User Messages (Tab 2)
     - Admin is able to see all the messages inside the system. He/she can delete anyone messages at anytime. Admin also can delete all the messages totally from the system as well.
   - o User Accounts (Tab 3)
     - This allows admin to fully control all information about the system users. Admin can edit, edit, and update all user account details and everything.
   - o My Account Setting: this allows admin to change their personal information inside the system.
   - o Logout: it allows admin to logout from the system.
   - o Help: provides necessary help for admin to operate on the system.
   - o About This App: it just to show version of the system.

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1.3.2 Scope of Study

The scope of the Wireless Controlled Information Display Unit system that has been developed is mostly based on web-based application that can be developed using Java 2 Enterprise Edition, HTML, XML, JSP, Applet, and other Java-based technology. As for the to-be web-based Wireless Controlled Information Display Unit system will be dynamic and generic. It means that it will be able to run on cross platform and it is real time controlling and monitoring. Moreover, the system will be accessible as long as we have an Internet connection.

1.3.3 Benefits and Significances of the Project

Based on the above problem identification, the project is designed to use currently available technology, touch-screen computer. This will lead to the challenging to enter the market and make the product commercialize. As well as, the application makes use of web-based Internet technology that allows any client or user to access the system any time they want.

The project will helps Universiti Teknologi PETRONAS, industry, and company with remotely control information displaying on the screen monitor by utilizing web-based application as followings:

- Administrative office can gain access into the system from anywhere as long as they have an Internet connection so that he or she will be able to control or monitor all the information that are displayed on the screen monitor.

- Lecturers also have ability to display his or her information on the screen monitor by sending SMS to the system. He or she can send SMS at anytime and from anywhere. This feature will provide lecturers with the east of high-end technology today.

- The project features can replace noticed-board so that we don't have to waste a lot of paper to stick on the noticed-board.

- Students are able to see the messages fast and efficient on the touch screen computer. They also can interact with the system by touching and browsing through that information.

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- The system is also benefit to businesses that are required for fast and efficient messages delivery. Like transportation hub or terminal, hospital patient waiting room, and airport

CHAPTER 2
LITERATURE REVIEW

2.1 CURRENT SYSTEMS SIMILAR TO THE PROJECT

Google lab in India has come out the software product called "Google Noticeboard". The product is intended to improve the way Indian communities share information online. It is an application that helps people access and share information over the Internet using digital notice board. By using Google Noticeboard, communities in India can access a variety of relevant information. It allows users to create text messages or record voice snippets and post them to one or more notice boards. Typically, each digital notice board carries publicly accessible messages. The Noticeboard allows users to engage in public communication with communities if it is compared to personal communication using email accounts. Communities with access to shared computers can use the Noticeboard for exchanging messages related to community announcements, social interactions, local buying and selling, and information that is of wider interest to the community. The Noticeboard may also be used for the community to engage in a dialog with benefactors, public servants, and other service providers who are geographically distant. For example, residents of an apartment complex can use the Noticeboard for posting announcements, or NGOs who own and operate computer centers in several villages can use the Noticeboard to enable village residents to communicate amongst themselves. [2]

A **bulletin board (pinboard, pin board** or **notice board** in British English) is a place where people can leave public messages, for example, to advertise things to buy or sell, announce events, or provide information. Bulletin board are often made of a material such as cork to facilitate addition and removal of messages or it can be placed on the computer so people can leave and erase message for other people to read and see. [3]

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With Wireless Controlled Information Display Unit system, the design of a system can be in such away that it can be replaced bulletin board. These concepts will be an environmental friendly into the system because the system functionalities allow users to put news or advertisement to the public to see.

Interactive Kiosk is a computer terminal that provides information access via electronic methods and unattended access to web applications. Integration of technology allows Kiosks to perform a wide range of functions, evolving into self-service kiosks. For example, Kiosks may enable users to enter a public utility bill account number in order to perform an online transaction, or collect cash in exchange for merchandise [4]. Wireless Controlled Information Display Unit has similarity with interactive kiosk. The concept of interactive kiosk can be utilized or improved to implement in the project. Nowadays, we do have touch-screen computer that allows the system more interactive and attractive to all users. The touch-screen computer is also integrated with wireless card, which allows easy communication between client users and server machine. With this kind of technology, this project has the uniqueness and challenging in today business market.

Multimedia University, located at Jalan Multimedia, 63100 Cyberjaya, Selangor, Malaysia, has come out with Bulletin Board Online. Their system allows authorized users to login into the system and post information to the public. The system is posted on the Internet so that any client can view anywhere at anytime. [5]

SERVICES @WEB
BULLETIN BOARD ONLINE

MULTIMEDIA UNIVERSITY

Wednesday, 20th April 2011

VIEW BULLETIN

By Today's Bulletin
By Date
By Bulletin Title
By Cont Centre

ADMIN LOGIN

Login

Username :

Password :

Login

For Assistant Director or authorized person only

SEARCH
Search bulletin

Search

▶ Search by year....

Requires Java and Javascript enabled on web browser.

1)**FINANCE:**
FEES PAYMENT REMINDER FOR TRIMESTER 3, 2010/2011

2)**ITSD:**
MMU Melaka Network Upgrade Pre-Migration Preparation

3)**STAD:**
HOCKEY FIELDS CLOSED FOR UPGRADING WORK (EXTENDED)

4)**STAD:**
IN CAMPUS/ HOSTEL FELLOW ON DUTY HOTLINE 2011

5)**ITSD:**
Have You Renewed Your Student Pass? (to All International students)

6)**STAD:**
HOCKEY FIELDS CLOSED FOR UPGRADING WORK

7)**EXAM:**
VALIDITY PERIOD OF MUET RESULTS

Total today's bulletin : 12

NOTE

* You don't have to login to read all bulletin in this new bulletin board online system. Anybody can view it. But only authorized person from each department can login and put message on the bulletin board.

* For students, seek help from the SRC if you want to put message on the bulletin board.

* If any query needed , please contact webmaster@mmu.edu.my

SERVICE PROVIDED BY

ENTERPRISE SYSTEM DEVELOPMENT & SUPPORT UNIT (formerly known as ICEMS)
Multimedia University
Jalan Multimedia
63100 Cyberjaya
Selangor Malaysia

http://bulletin.mmu.edu.my

Note : This site is viewed best at 1024 x 768 Pixels. Please change your display setting. Otherwise you can't view some information in this site. Thank you.

Figure 2.1.1: Multimedia University Bulletin Board Online

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CHAPTER 3

METHODOLOGY

3.1 METHODOLOGY

In this chapter, the methodology will be applied for the project development. In the consideration of time and quality of the system prototype, **Prototyping Methodology** will be used for the whole system development lifecycle. The prototyping approach will be used to gather the user and system requirement, feasibility study and analysis, and doing requirement elicitation.

The key advantage of a prototyping-based methodology is that it very quickly provides a system for the users to interact with, even if it is not ready of widespread organizational use at first. Prototyping reassures the users that the project team is working on the system and prototyping helps to more quickly refine real requirements.

Major phases and deliverables for the project development:
  i.   Project Initiation and Proposal
       a. Conduct a further research on project feasibility
       b. Project proposal
       c. User Requirement visit and study
       d. Preliminary Report/Progress Reports
  ii. Planning and Analysis Phase
       a. Identify problem and opportunity
       b. Get user requirement and system requirements
       c. Evaluate and analyze the requirements
       d. Refine the requirements.

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iii. Design Phase

    a. System Architecture

    b. UML diagram design

    c. Database design and its schema

iv. Implementation and System Prototype

When come to this phase, it means that all the system coding, software system configurations and installation will be done step by step until all components of the system are totally completed and working correctly. The followings are the main processes under this final stage:

    a. Software installation for development

    b. Software configuration (Glassfish Web Server and MySQL and Ozeki SMS Server)

    c. Implementation of the Wireless Controlled Information Display Unit System (Coding)

3.1.1 Prototyping Architecture Design

In the prototyping methodology, it will perform the analysis, design, and implementation phases concurrently, and all three phases are performed repeatedly n a cycle until the system is completed. With these methodologies, the basics of analysis and design are performed and worked immediately begins on a system prototype, a "quick and dirty" program that provides a minimal amount of features. The first prototype is usually the first party of the system that the user will use. [6]
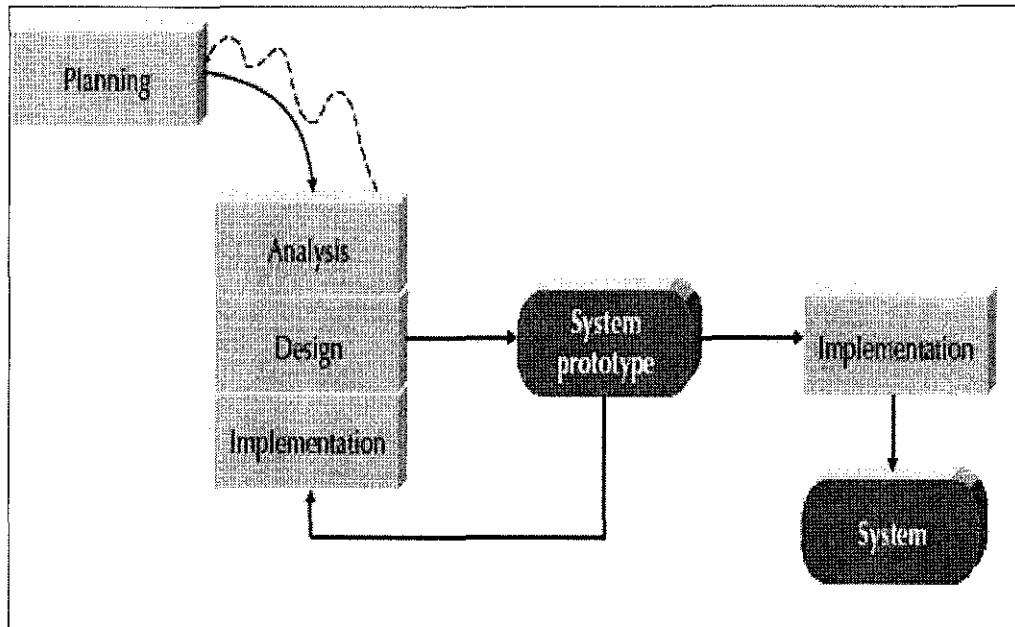
Figure 3.1.1.1: Prototyping methodology for the web-based Wireless Controlled Information Display Unit system.

3.2 DEVELOPMENT TOOLS

The Wireless Controlled Information Display Unit system will be designed and developed by using the World Wide Web technology and the followings are the list of hardware and software tools required:

Software:

- Java Web Server that can process JSP scripting language
- Apache Tomcat Server
- Database Management System, MySQL 5.0.41
- JDBC Application Programming Interfaces (API) with MySQL
- Adobe Photoshop CS3
- Adobe Macromedia Dreamweaver CS3
- Platform operating under Microsoft Windows 7
- Java, CSS, JavaScript, AJAX, XML, and SQL Editor which is Notepad++
- Java SMS gateway with RTU (Remote Terminal Units), OZEKI Message Server 6.4

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Hardware:

- GSM telephone line modem
- Personal Computer that is running on Windows Platform with
  - Intel Pentium D 3.4 GHz
  - 3GB of DDR2 RAM
  - 160GB of Hard Disk
- SIM card, telephone service company
- ADSL modem
- Wireless/WiFi Internet modem

In order to complete final year project, we have to come out with the work draft that lists down all tasks and activities that we are going to do for the whole project. Below is the Gantt chart for final year project one and two.

ID	Task Name	Duration	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10
1	Selection of FYP Topic	11 days	▓				
2	Submission of Project Proposal	6 days	▓				
3	Proposal Approved by RC	5 days	▓				
4	FYP Research Class	16 days	▓				
5	User Requirement Research	10 days	▓				
6	Submission of Preliminary Report	5 days		▓			
7	Seminar 1 - Preliminary Report	1 days		▓			
8	Get User Requirement	10 days		▓			
9	Analyze the Requirements	12 days		▓			
10	Project Planning and Design	10 days			▓		
11	Design System Architecture	16 days			▓	▓	
12	Design GUI and Layouts	15 days			▓	▓	
13	Configure Server Setting	3 days				▓	▓
14	Submission of Progress Report	5 days				▓	▓
15	Seminar 2- Progress Report	1 days					▓
17	Submission of Interim Report	5 days				▓	▓
18	FYP 1 - Oral Presentation	2 days				▓	▓

Figure 3.1.1.2: Gantt Chart for FYP 1

ID	Task Name	Duration	Jan-11	Feb-11	Mar-11	Apr-11	May-11
1	Download all required softwares	3 days	▓				
2	Set up Server, database, and IDE	6 days	▓				
3	Set up wireless router	2 days	▓				
4	Configure Server	16 days	▓				
5	Running localhost	3 days	▓				
6	Start coding	5 days		▓			
7	User Management Modules	1 days		▓			
8	Administration Modules	10 days		▓			
9	Client Modules	14 days		▓			
10	GUI design	20 days			▓	▓	
11	Testing	20 days			▓	▓	
12	Implementing Prototype	20 days			▓	▓	
13	Submission of Progress Report	40 days				▓	▓
14	Submission of technical report	15 days				▓	▓
15	EDX event	2 days				▓	▓
17	Submission of Dissertation	2 days				▓	▓
18	FYP 2 - Viva Presentation	1 days				▓	▓

Figure 3.1.1.3: Gantt Chart for FYP 2

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CHAPTER 4

RESULT AND DISCUSSION

In this chapter, all the results and discussions will be presented and discussed. The description will start off with how to use the system and all available functionalities. Rather than this, we will talk about the complete process on how to develop the system, coding and database of the system.

4.1 SYSTEM GRAPHICAL USER INTERFACES

The system consists of three main windows such as client window, user window, and admin window. The details of the windows and its functionalities will be described as the following:

4.1.1 Client Window
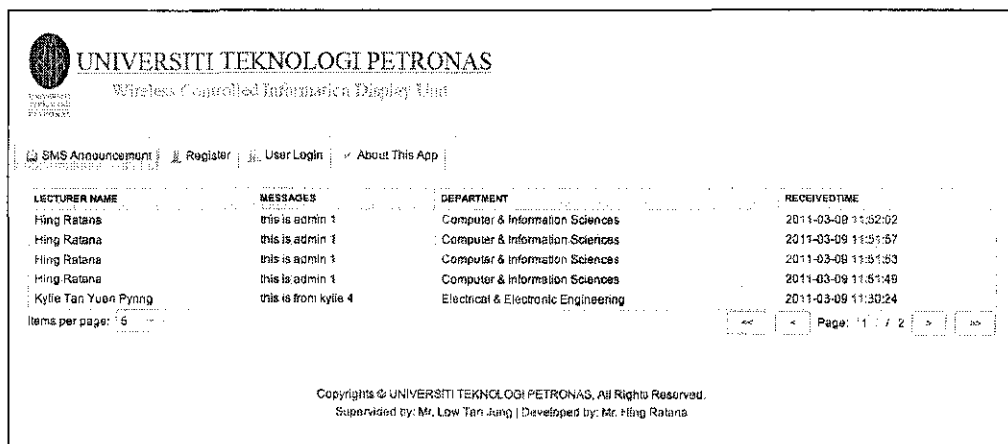
Figure 4.1.1.1: Client Window GUI

This window is the first window that the user will see when they are accessing to the website address. The layout has been designed into three parts. The first part is the

header layout, which consists of the UTP logo. Second part is the tab container, which consist of SMS announcement, register, user login, and about this app. And finally, the footer, it provides some information about copyrights, supervisor, and developer.

Figure 4.1.1.2: SMS Announcement Tab Control

This tab function is the main function that shows live update about the information that has been posted by users. It will display lecturer name, lecture messages, lecturer department, and the time that the system has been received. Moreover, the bottom bar consists of items per pages, first button, last button, previous button, and next button. These controls will allow users to browse through all the information that are available on the screen. If you notice, the messages are not going to load every record on to the screen. This is because of memory constraint. The message table is controlled by the number of messages that will be going to display, and the button to browse through all of the records.
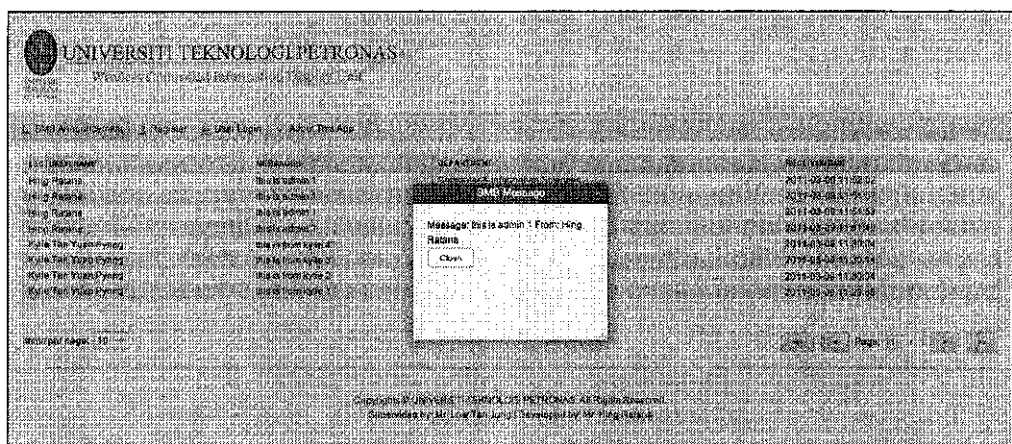
Figure 4.1.1.3: Pop Up Message

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Client window also support touch screen so that when the users put the finger on the row of the table, the pop up window will come out and show the message details and who is the owner of the message.

Figure 4.1.1.4: Register Tab Control

This page allows users to send their information to administrator of the system in order for them to use the system. Every box that the users fill in is already embedded with validated JavaScript so the information will be checked first before it can be sent to administrator. Users can use the system whenever the administrator has approved on the registration. This provides the fully controls of the users of the system.

Figure 4.1.1.5: User Login Tab Control

This tab control will allow users or administrator to login into the system by providing username and password. If it is the user, it will lead to the user window, and if it is administrator, it will go to admin window. Additionally, if the users or administrator has forgotten their password, they can request the new password by clicking on forgotten password button and fill in the email address.
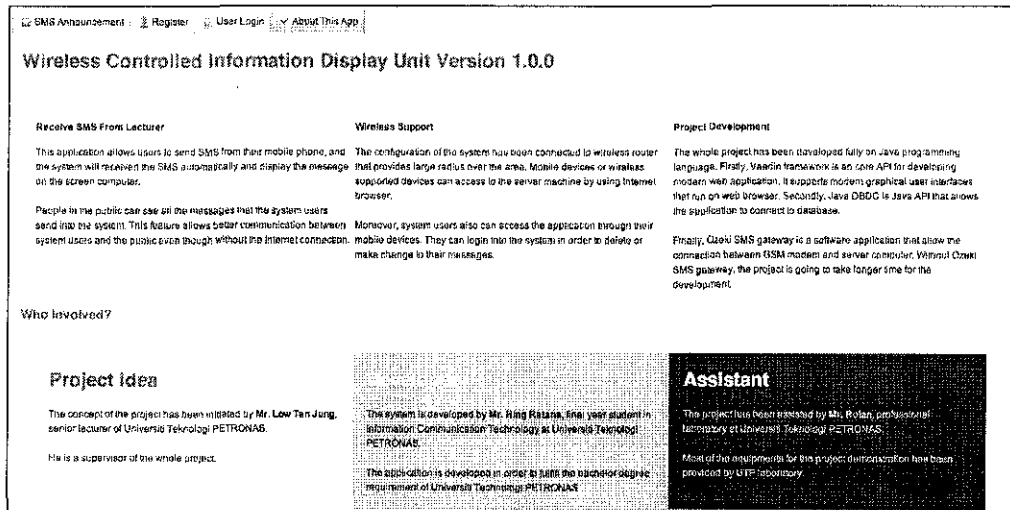
Figure 4.1.1.6: About This App Tab Control

This tab control provides additional information for the project and who is involved in the project development.

4.1.2 User Window
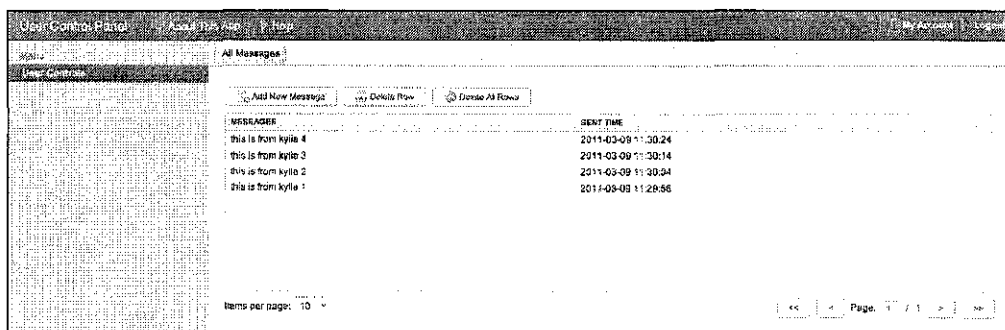
Figure 4.1.2.1: User Window GUI

After the user login into the system, the system will pop up this window. User window consists of three parts such as top bar, left menu bar, and tab control. The

top bar allows users to logout from the system, to edit their account information details, to search for help, and about the system version. Secondly, the left menu function, it will display the tab control when the users click on it. Finally, the tab control area will allow users to fully control on their messages.
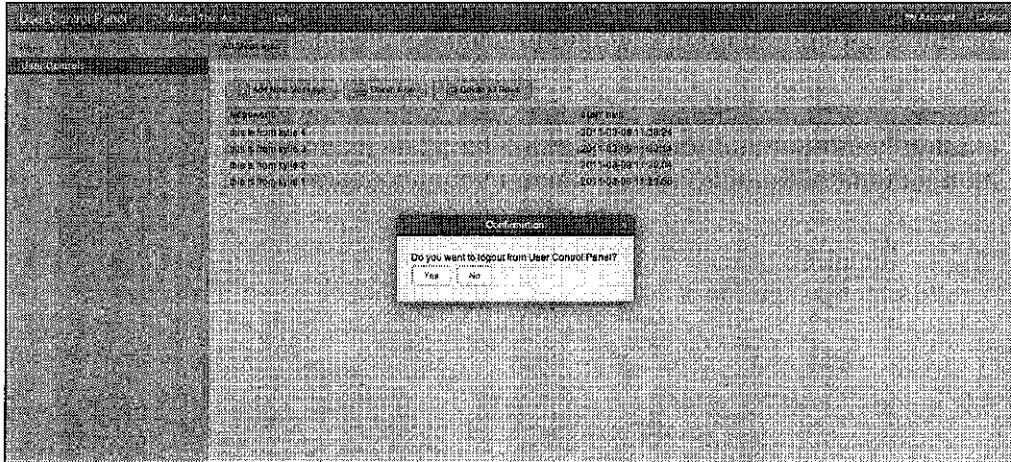

Figure 4.1.2.2: Logout Confirmation

When the user click on the logout button, the confirmation window will pop up and ask for confirmation whether he/she want to logout from the user window.
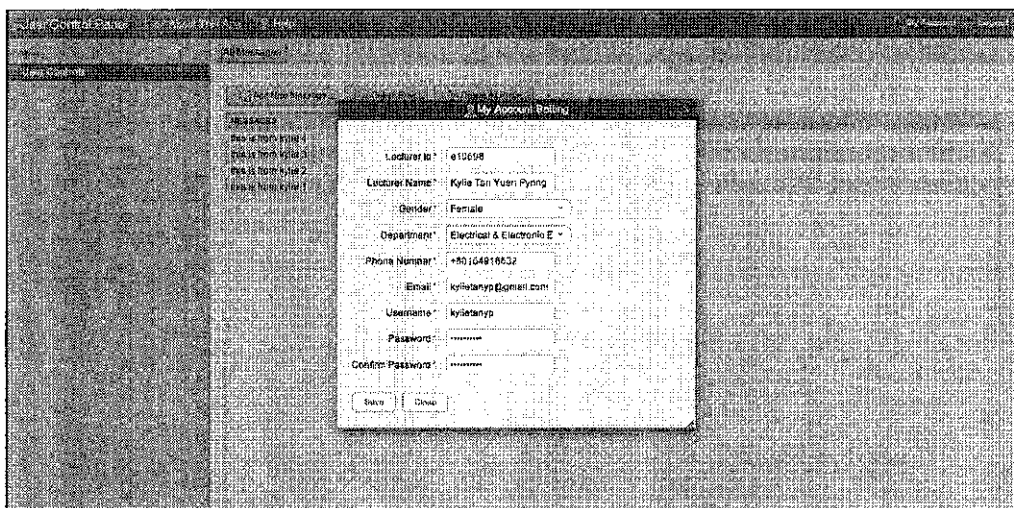
Figure 4.1.2.3: User Account Setting

User can make changes to their personal information by clicking on the My Account button. This window also embedded with JavaScript to check up the human error that

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may be made by the users. If users change their hand phone number, they have to update their information for the system so that the system will be able to receive the SMS from the users.
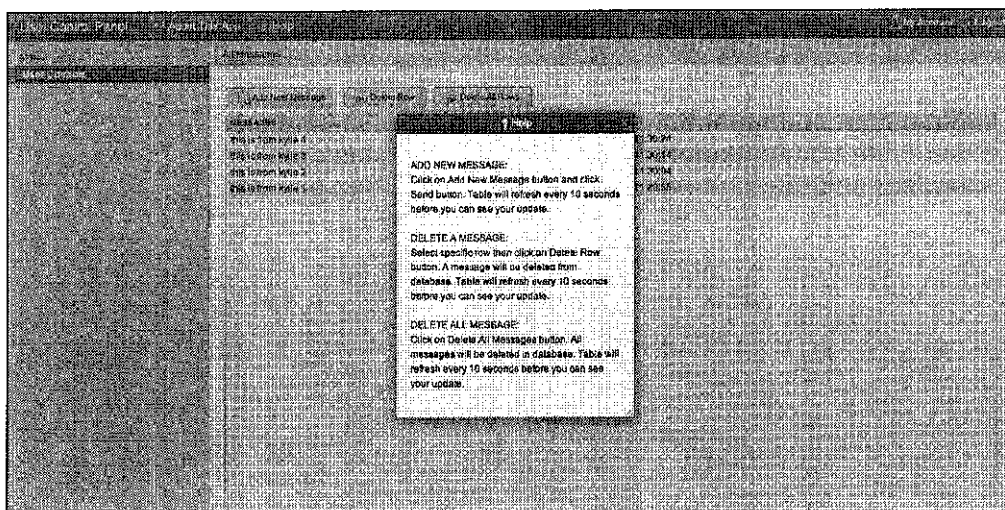

Figure 4.1.2.4: User Help

By clicking on the Help button, the Help window will pop up on the screen. The window contains the information that users need to know how to use the system.
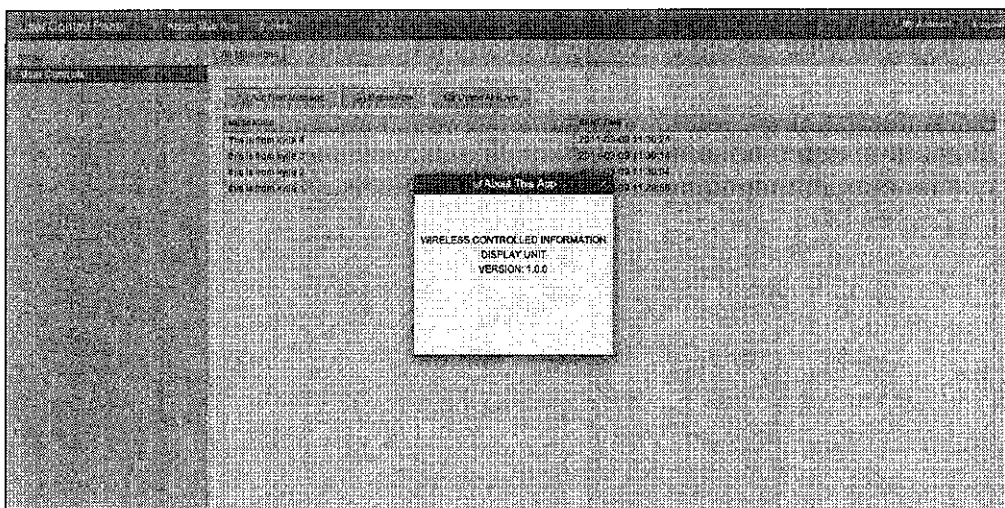

Figure 4.1.2.5: About This App

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Users can click on the button, and it will show users about the version of the application itself.
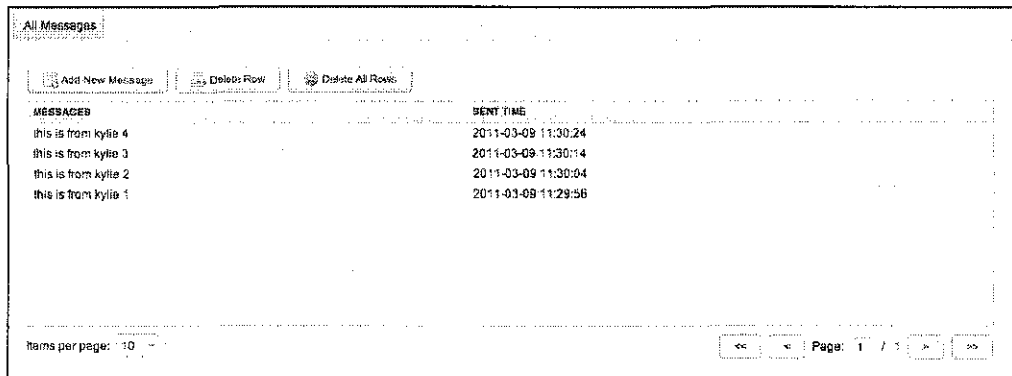
Figure 4.1.2.6: User Message Control

This tab control allows users to Add New Message, Delete Row, and Delete All Rows. Simply as it is, user and add the message into the system by clicking on add new message button. The following screen will come up:
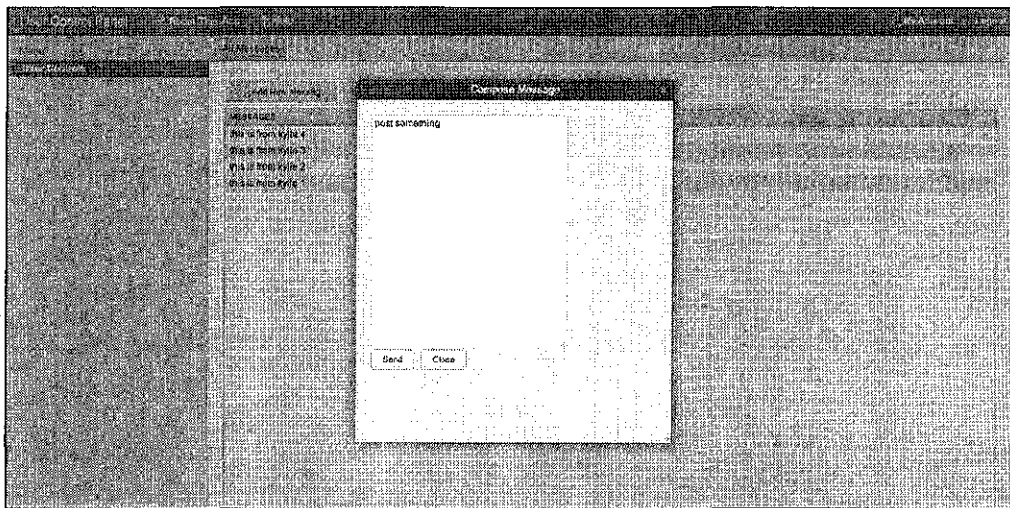

Figure 4.1.2.7: Compose Message

This screen allows user to post their new message into the system, and the message will immediately appear on the client window so that the public can always see the message.

The delete row button is to delete particular row, and if the users want to delete all rows, they also can do so by clicking on the delete all rows button.
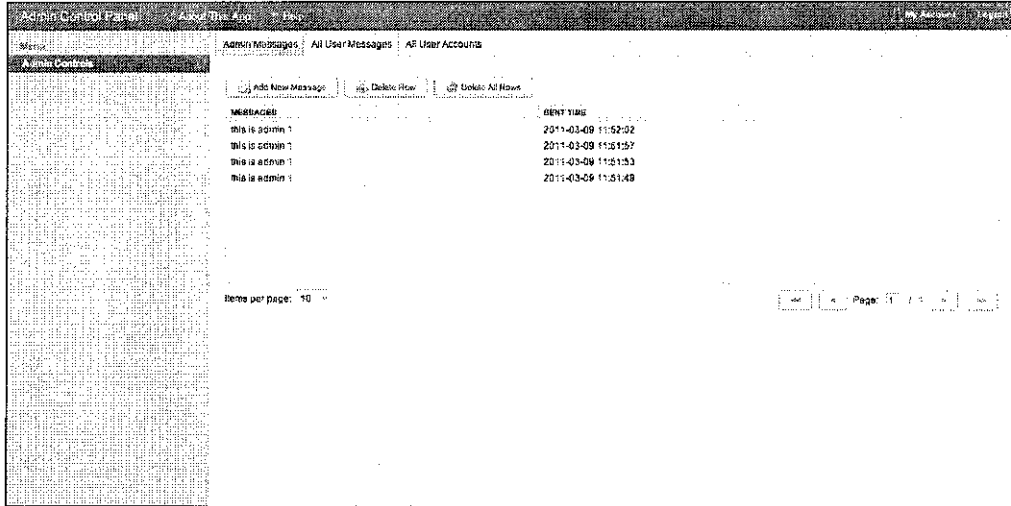
4.1.3 Admin Window

Figure 4.1.3.1: Admin Window GUI

After admin has been authenticated, it will lead administrator into this window. System administrator also has the same functionalities as the system users. Additionally, another two upper user functionalities such as All User Messages and All User Accounts are included for the administrator.

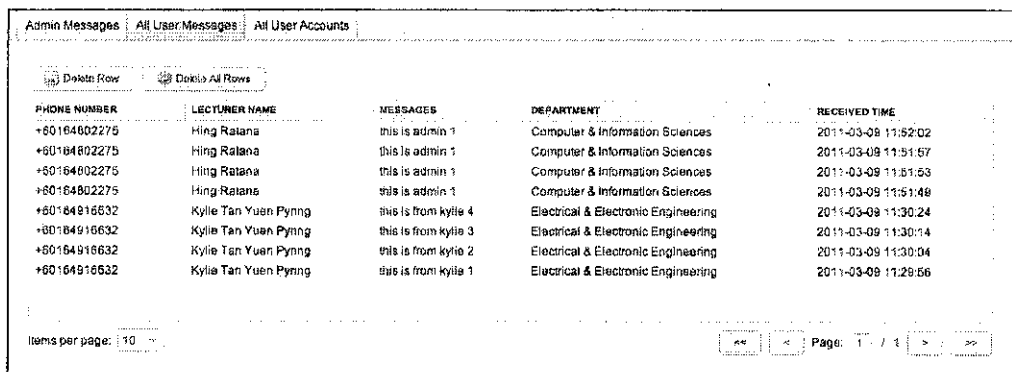The two super user functionalities will be describe below:

Figure 4.1.3.2: All User Message Tab Control

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This function will allow administrator to delete a message or delete all messages from the system. Administrator can use the bottom control to browse through all the messages as well.

Figure 4.1.3.3: All User Account Tab Control

As the administrator, they can see all the users account information and make some changes if it is necessary. System administrator is able to Add New User, Edit/Register User, and Delete User.

4.2 SYSTEM CODING AND SOFTWARE DESIGN

After we have fully understood how the system work by looking at the graphical user interfaces, we are now discussing about the coding behind the software itself. The software can be reliable and working properly depending on the software design of the system. For this project, I am designing the software by using the concept of object-oriented programming. There are three software layers that I am focusing on. The first one is graphical user interfaces, second is business logic, and finally is database. These three layers of coding must be independent or couple-less from each other. I will show the project structure as below and describe what it does.

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```
▼ 📁 displayunit
  ▶ 📋 Deployment Descriptor: displayunit
  ▼ 📦 Java Resources
    ▼ 📂 src
      ▶ 🔲 database
      ▶ 🔲 database.encryption
      ▶ 🔲 displayunit
      ▶ 🔲 displayunit.gui.adminwindow
      ▶ 🔲 displayunit.gui.clientwindow
      ▶ 🔲 displayunit.gui.components
      ▶ 🔲 displayunit.gui.userwindow
      ▶ 🔲 displayunit.widgetset
    ▶ 📚 Libraries
  ▶ 📚 JavaScript Resources
  ▶ 📁 build
  ▶ 📁 WebContent
▶ 📁 Servers
```
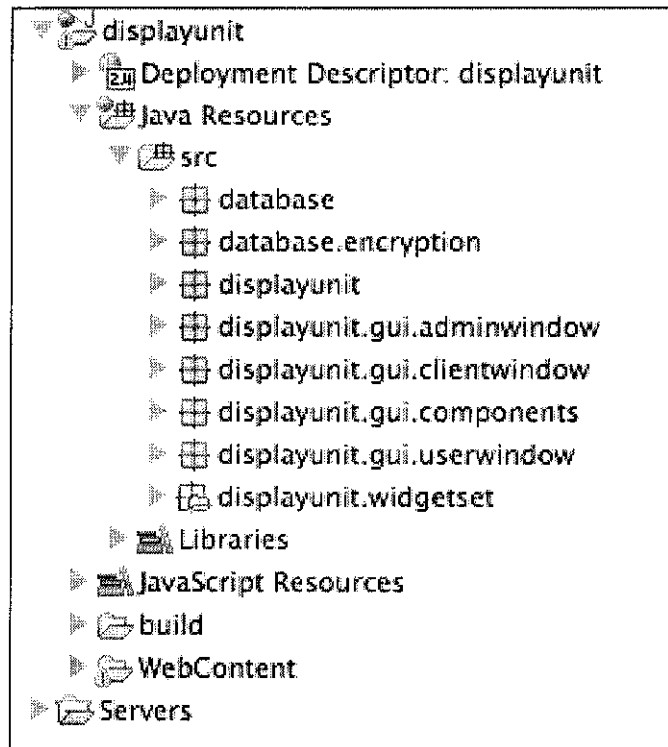
Figure 4.2.1: Project Structure

As we can see in the picture above, we are mainly focused on the Java Resource folder. The first folder is database folder. This folder contains all the business logic for the system to interact with the physical database. Second folder is database.encryption folder. This folder contains the encryption algorithm in order to encrypt and decrypt the password. The third folder is displayunit folder. This folder is the main application file that will execute and run the whole system. And the rest of the folders are the folders that contain the graphical user interface design coding. All these folders are mainly to generate GUI.
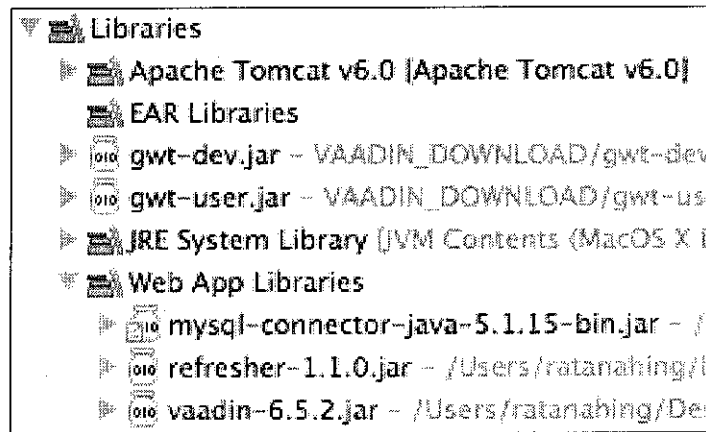
Figure 4.2.2: Libraries and API

In order to develop the system, we need the libraries and API like in the figure 4.2.2. Now I need to explain the Web App Libraries. The first library is MySql connector library. This library allows programmer connect to database, read, write, and do other functionalities with MySql database. Secondly is refresher library, this library is developed under Vaadin add-on. Its function is allowed web page to keep alive or refresh according to the specification. Thirdly is Vaadin library. This library is the main library for the whole system. It is basically allowed programmers to develop web application purely on Java programming language.

In order to clearly understand about the system, we have to look through the coding segment of the project as well. Below is the coding segment of the main executable file for the project.

```
 +import javax.servlet.http.HttpServletRequest;

 @SuppressWarnings("serial")
 public class DisplayunitApplication extends Application implements HttpServletRequestListener {

        //thread local for display unit application
        private static ThreadLocal<DisplayunitApplication> currentApplication = new ThreadLocal<DisplayunitApplication>();
        private String username = "";
        private String phoneNumber = "";

   +    public void init() {]

        //set application instance
   +    public static void setInstance(DisplayunitApplication application){]

        //get application instance
   +    public static DisplayunitApplication getInstance(){]

        //start application
   +    public void onRequestStart(HttpServletRequest request, HttpServletResponse response) {]

        //end application
   +    public void onRequestEnd(HttpServletRequest request, HttpServletResponse response) {]

        //authenticate application
   +    public boolean authenticate(String username, String phoneNumber, String role){]

        //set logout
   +    public void logout(){]

   +    public void setUsername(String username) {]

   +    public String getUsername() {]

   +    public void setPhoneNumber(String phoneNumber) {]

   +    public String getPhoneNumber() {]

   }
```

Figure 4.2.3: Main Executable File

The development of the project is purely developed based on Java programming language. The development of this project is based on Vaadin framework so we can see that DisplayunitApplication class is extended from Application class, which is located under Vaadin framework. Imagine, there are three main windows all together – client window, user window, and admin window. All these three main window need to be connected with each other, it is called transaction. In order to maintain the data to be transferred from one window to another, we have to create ThreadLocal variable. This variable will be used as an instance object of the application.


```
public class dbConstants {

        public static final String DRIVER_NAME = "com.mysql.jdbc.Driver";
        public static final String DATABASE_USERNAME = "wcidu";
        public static final String DATABASE_PASSWORD = "wcidu123";
        public static final String DATABASE_URL = "jdbc:mysql://127.0.0.1/displayunit";

}
```

Figure 4.2.4: Database Configuration File

This file is an important for database configuration. If the database and its privilege change, developer has to update this file as well.
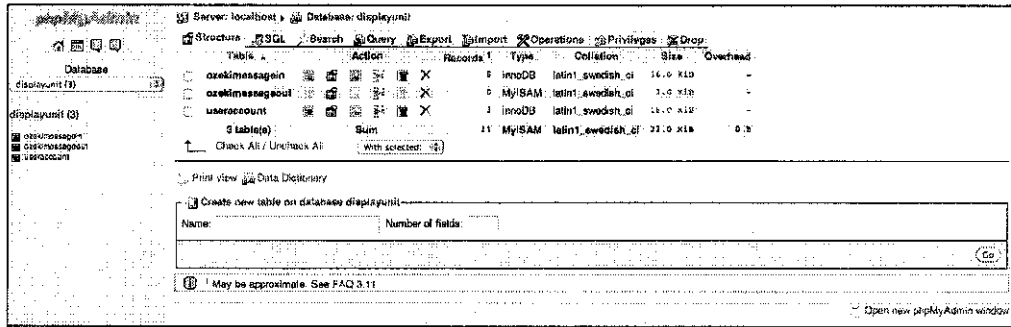
4.3 SYSTEM DATABASE

Figure 4.3.1: Displayunit database

In order to the ease of database development, I have installed phpMyadmin to control all my database tables. It provides significant functionalities to the database design and development. For the whole system, we are required three tables such as ozekimessagein, ozekimessageout, and useraccount tables. Ozekimessagein table is the table that stores all the SMS that the user sent to the system. Ozekimessageout is the table that stores the SMS that will be needed to send out from the system. And finally, useraccount table is the table that stores all user account information.

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CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

In conclusion, the project has been done and implemented as the demonstration of fully complete system. The real equipment has been purchase through i-GEN fund number: 15-8900-010. Moreover, the project will be implemented at the lecturer office block so this let the lecturers to use the system for their convenience ways.

I can say that this project is a very good project and challenging. It uses Java technology for the developing web-application so it can be designed in Object-Oriented concept. In term of web security, Java technology is more secure than other technology such as PHP.

As the software developer, I have been learning a lot from the project itself. I have learnt technical and non-technical in software development. And Finally, I would like to thank for the readers who pay sometimes to read and learn about my system. For more information, you may contact me through email: ratanahing@gmail.com.

5.2 RECOMMENDATION

I would like to recommend on the project development. I have found out that there are some difficulties when it comes to the implementation part. What we have planned in the planning and analysis is different a bit from the development. I have been changing my concept and way of programming due to the problems that have been faced. So to be a good programmer as well as software developers, ones must be flexible to change from one technology to another. The more you know about technology, the better you are.

Moreover, you have to know more hardware technical knowledge as well because when it comes to the implementation in the real hardware, you have to know how the whole system is worked together with the software. If you have both knowledge, it will allow you to be fast in developing the software.

REFERENCES

[1]   Oracle Sun Developer Network, "Java 2 Platform, Enterprise Edition (J2EE) Overview", < http://java.sun.com/j2ee/overview.html>, date accessed on September 19, 2010

[2]   Google Lab India, "Google Noticeboard", website link: <http://labs.google.co.in/noticeboard/>, extracted information on 23 April 2011.

[3]   Wikipedia, "Bulletin Board", <http://en.wikipedia.org/wiki/Bulletin_board>, date accessed on 23 April 2011.

[4]   Wikipedia, "Interactive Kiosk", <http://en.wikipedia.org/wiki/Interactive_kiosk>, date accessed on 23 April 2011.

[5]   Multimedia University, "Bulletin Board Online", website link: <http://bulletin.mmu.edu.my/>

[6]   System Analysis and Design with UML Version 2.0: An Object-Oriented Approach, Second Edition by Alan Dennis, Barbara Haley Wixom, and David Tegarden. Page: 55, 121, 259, 461

APPENDICES

Installing Ozeki SMS Server

The Ozeki Message Server installation is similar to any Windows applications. Before you do the installation, you must exit all Windows applications. After having done it, locate the **OzekiMessageServer.exe** file on the installation CD- ROM. If you have downloaded the application from

the Internet, **OzekiMessageServer.exe** is in your download directory. Start **OzekiMessageServer.exe** by double-clicking on the icon and follow the instructions:


On the Welcome screen click **Next** to start the Installation (Figure 3). This will bring up the End User License agreement of the software. It is important to read this and to accept the agreement if you wish to use the softwer. If you have accepted the End User License Agreement, you will move to the destination directory selection form. On this form, you have to specify the directory you

wish to use. Make sure you have at least 20 Megabytes of hard disk space available on the drive you have chosen. Following this you will be faced with some options about icon creations. After the installation is finished, a shortcut will be available in the Windows **Start** menu and a taskbar icon will appear. This shortcut is a reference to the Ozeki Server Monitor. The monitor application can be used to get information about the state of the server and it helps to open the Ozeki Server Manager configuration screen.


By clicking on the menu item, a login window comes up. This login window requires a user name and a password. If you didn't specify a login name and a password during the installation, you can use the built in administrator account. Username: admin, Password: abc123. We suggest to change the default password immediately after login!
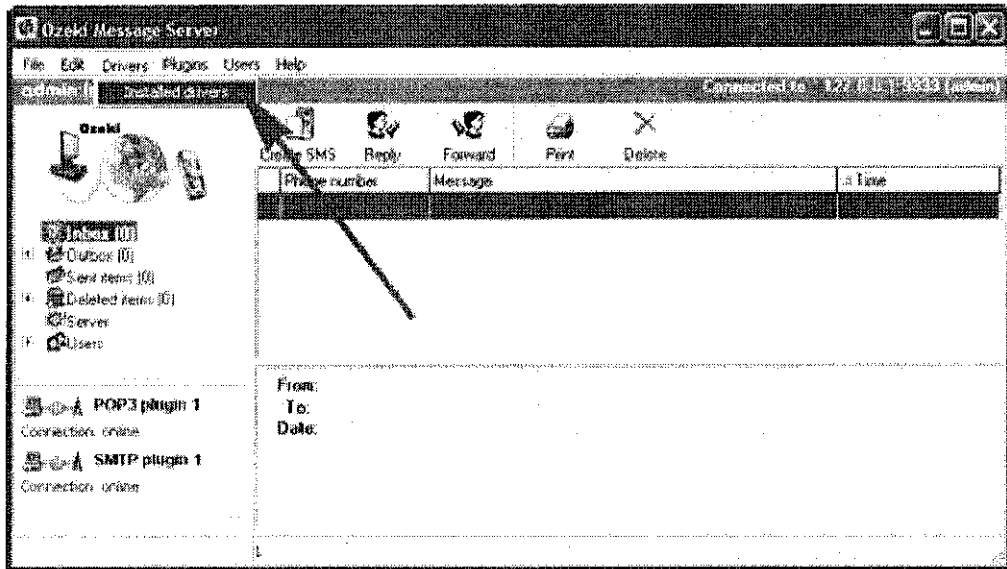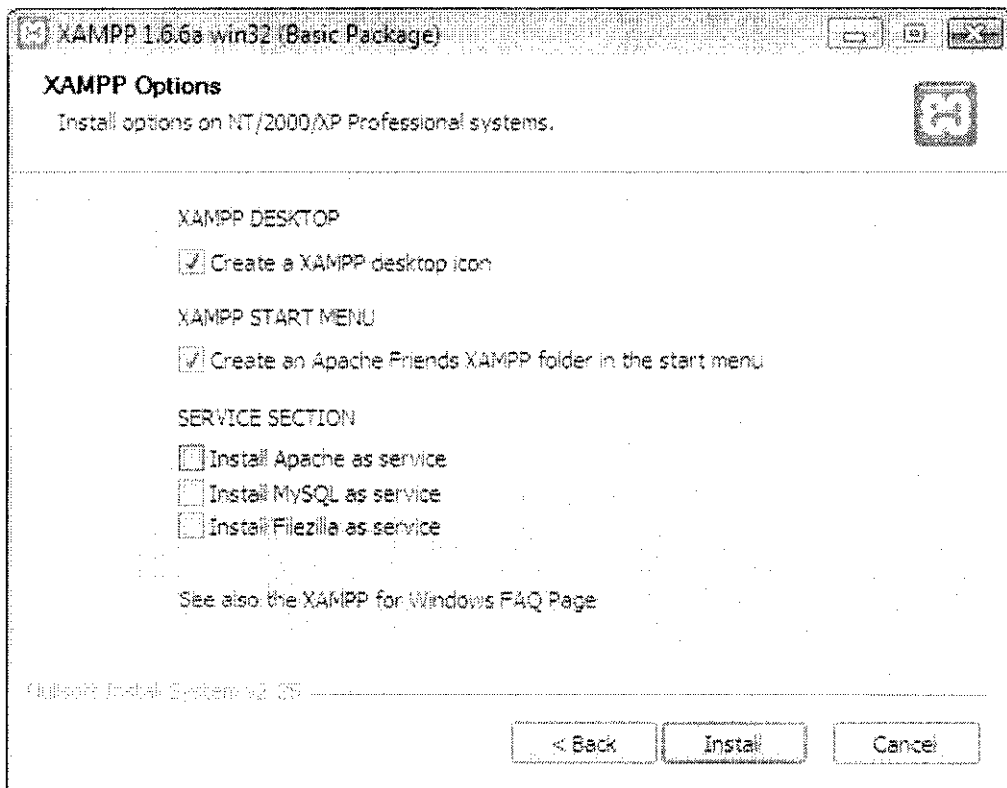
Ozeki Driver Configuration

1. Install OZEKI SMS Server
2. Install NOKIA PC Suite (for USB data cable driver)

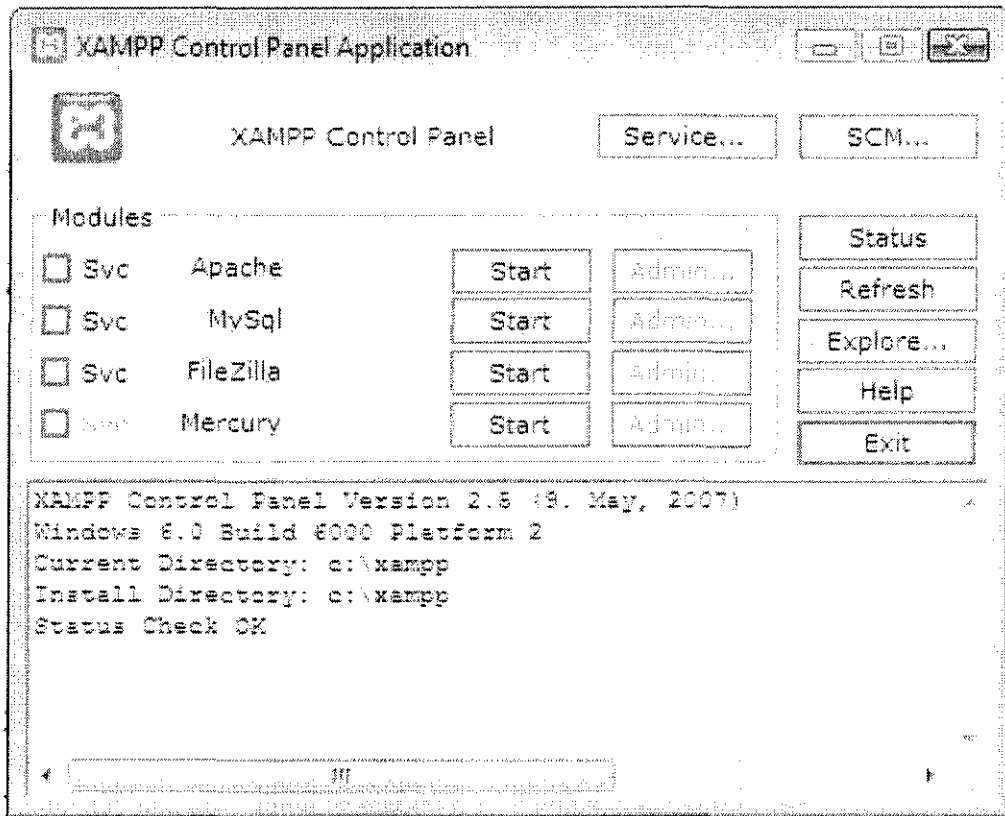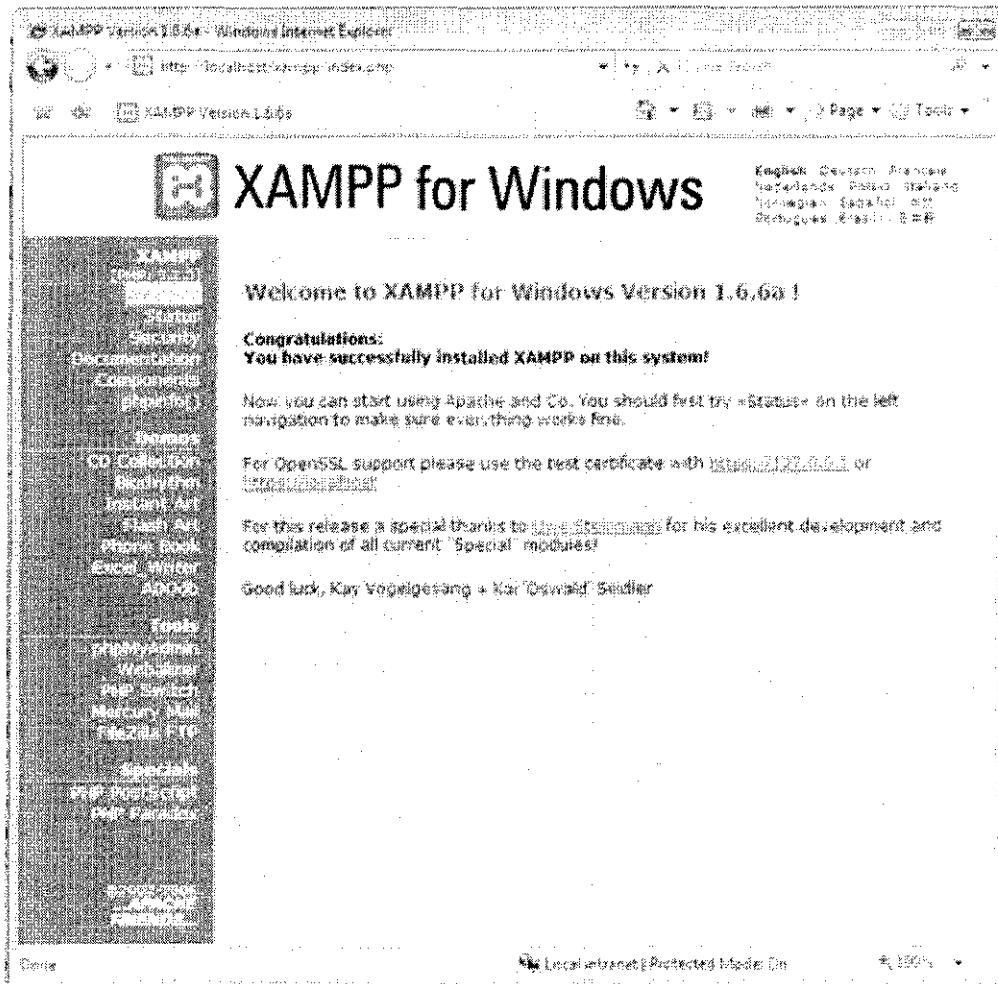   Then all needed information that related to GSM modem will be recognized by OZEKI Message Server as below.

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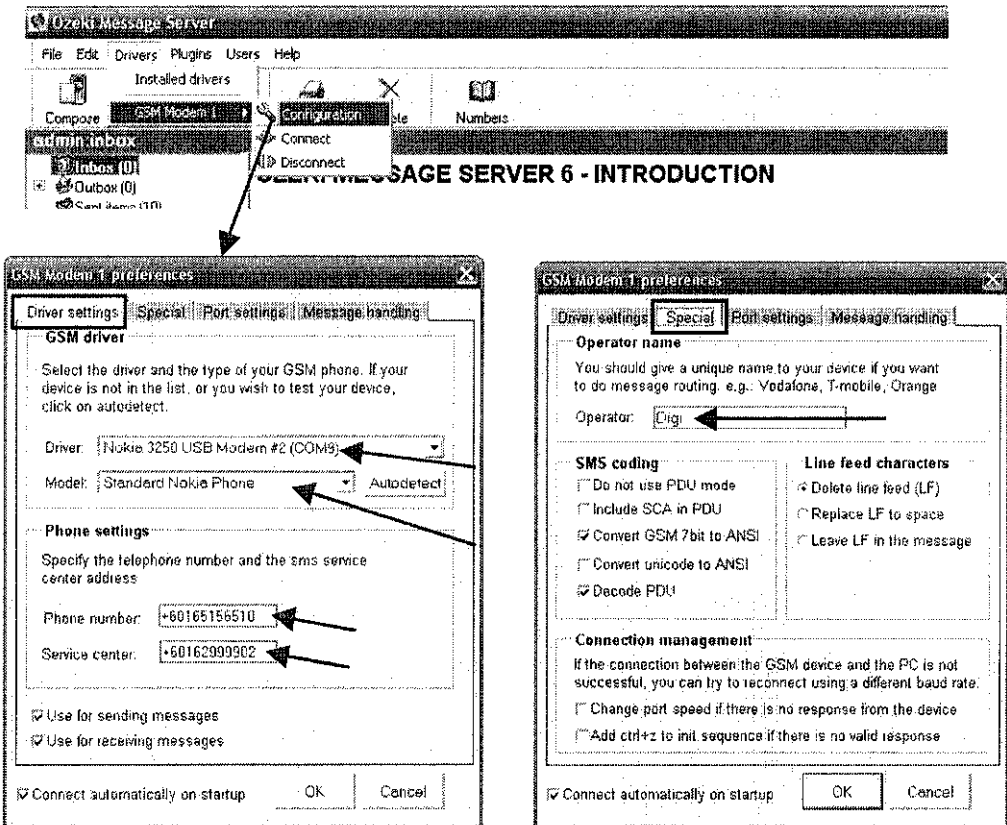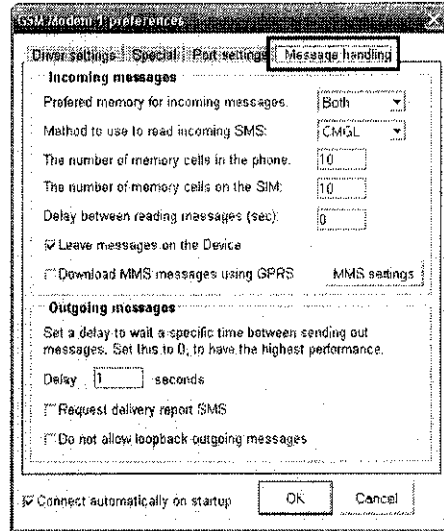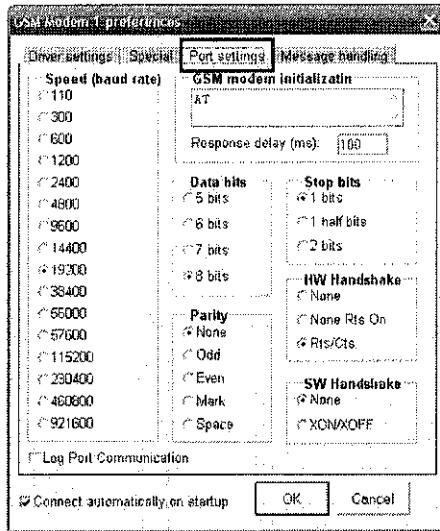
** If other phone is connected, its model will be shown instead of NOKIA

Installing xampp:

Installing Apache Tomcat And Configure With Eclipse

1. If you do not have Apache Tomcat on your machine, you will first need to download and unzip Apache Tomcat (this scenario was written using Apache Tomcat version 5.0.28, but other versions can be substituted).

2. Start the Eclipse WTP workbench.

3. Open Window -> Preferences -> Server -> Installed Runtimes to create a Tomcat installed runtime.

4. Click on Add... to open the New Server Runtime dialog, then select your runtime under Apache (Apache Tomcat v5.0 in this example)

New Server Runtime

New Server Runtime

Define a new installed server runtime environment

Runtimes are used at build time to compile projects.
Select the type of runtime that you want to define:

- Apache
  - Apache Tomcat v3.2
  - Apache Tomcat v4.0
  - Apache Tomcat v4.1
  - Apache Tomcat v5.0

View By: Vendor

Description: Apache Tomcat v5.0 supports J2EE 1.2, 1.3, and 1.4 Web modules.

< Back   Next >   Finish   Cancel

5. Click Next , and fill in your Tomcat installation directory :

New Server Runtime   X

Tomcat Server

Specify the installation directory

Name:

Apache Tomcat v5.0

Tomcat installation directory:

D:\jakarta-tomcat-5.0.28   Browse...

JRE:

j2sdk1.4.2_06   ▼   Installed JREs...

< Back   Next >   Finish   Cancel
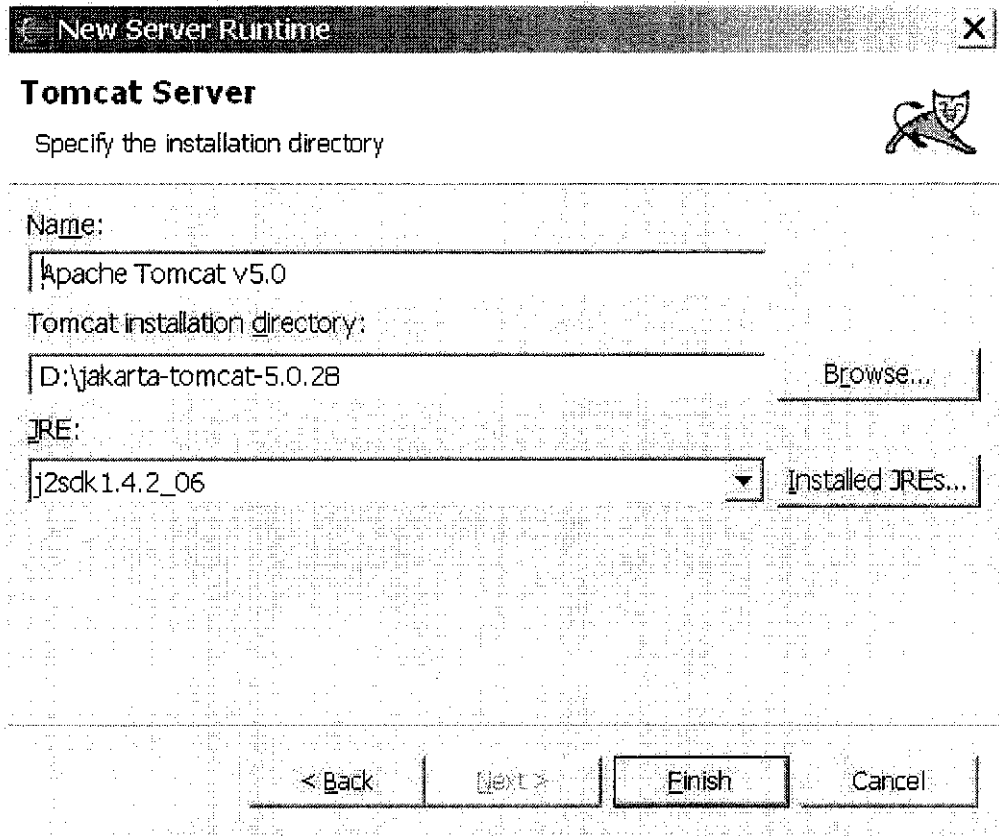
6. Ensure the selected JRE is a full JDK and is of a version that will satisfy Apache
Tomcat (this scenario was written using SUN JDK 1.4.2_06). If necessary, you can
click on Installed JREs... to add JDKs to Eclipse.

7. Click Finish