

UTP IRC, Mobile Facility System

by

Suriana Binti Abdul Karim

Dissertation submitted in partial fulfillment of
The requirements for the
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Universiti Teknologi PETRONAS

Bandar Seri Iskandar

31750 Tronoh

Perak Darul Ridzuan

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CERTIFICATION OF APPROVAL

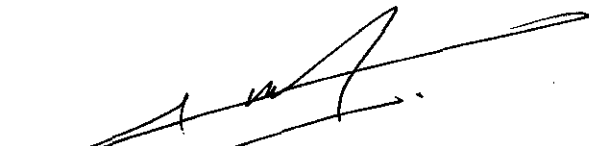
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Suriana Binti Abdul Karim

A project dissertation submitted to the
Information Communication Technology Program
Universiti Teknologi PETRONAS
in partial fulfillment of the requirement for the
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(INFORMATION COMMUNICATION TECHNOLOGY)

Approved by,



(Izzatdin Bin Abdul Aziz)

UNIVERSITI TEKNOLOGI PETRONAS

TRONOH, PERAK

January 2007

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.



SURIANA BINTI ABDUL KARIM

ACKNOWLEDGMENTS

I am glad that after gone through all the hardship in the making of 'UTP IRC, Mobile Facility System', I have successfully completed the whole requirement in Final Year Project. I would like to take this opportunity to give acknowledgment and recognition to the entire individual who has helped me throughout the past two semesters.

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ABSTRACT

The wireless world is experiencing a revolution; with the imminent introduction of third-half generation (3.5G). Universiti Teknologi PETRONAS (UTP) Information Resource Centre (IRC), Mobile Facility System is a Final Year Project (FYP) dedicated to the UTP students that provides opportunities to enhance skills and knowledge. The objective of Mobile Facility System for IRC is to integrate the technologies combine with the IRC services in order to enhance the efficiency of the IRC to serve its users, currently the targeted user are students. Mobile facility system is expects to be widely used in the future. In other words, this project is hoped to boost the way of communication in university life style. The aim for this project is to conduct a study of library middle application on phone. This project requires ongoing research on mobile library system by implementing a lot of observation, interviews, questionnaires, literature reviews and much more to ensure the theory able to serve the targeted users. In order to explore the use of mobile phone and handled IT devices as an additional communication channel, many factors need to be considered such as it constraint and limitations. This project will be valuable when it manage to expand the accessibility of IRC and optimize the anytime and anywhere learning for students.

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ABBREVIATIONS

2G	Second Generations
3G	Third Generations
GSM	Global System for Mobile communication
HSDPA	High-speed Downlink Packet Access
IRC	Information Resource Center
J2ME	Java 2 Micro Edition
LAN	Local Area Network
MBPS	Mega Bit per Second
MMS	Multimedia Messaging Service
OPAC	Online Public Access Catalog
PDA	Personal Digital Assistant
PDC	Primary Domain Controller
QOS	Quality of Service
SDLC	Software Development Life Cycle
SMS	Short Messaging System
UMTS	Universal Mobile Telecommunications System
UTP	Universiti Teknologi PETRONAS
WAP	Wireless Application Protocol
WCDMA	Wideband Code Division Multiple Access

CHAPTER 1

INTRODUCTION

1.1 Background of Study

Universiti Teknologi PETRONAS Information Resources Center (UTP IRC), Mobile Facility System is a mobile-library system that is design as a different or an alternative way for the UTP IRC to perform services to their users. This system will be a new method of communication medium for citizen of UTP, via mobile. The usage of mobile has change radically as the speed, functionality and application improved. The mobile device will become far more important in future and hence by having this system it can improve the service to the users.

UTP IRC was started in July 1997; aim to be the support centre for academic activities. IRC provides housing on approximately 170, 000 volumes of items. The collection comprises of printed and non-printed materials raging from book, periodicals, in-house reports, audiovisual and multimedia. [1]

From the research, IRC were supports by many facilities such as books, Online Public Access Catalogue (OPAC), IT training zone, auditorium, discussion room, lockers and much more in order to allow the students to explore and gain knowledge as much as possible during their studying time.

In line with rapid IT development, IRC is committed to incorporate high-tech and up-to-date IT infrastructure, therefore an enhancement of services in IRC should be

implemented. An initiative to shift the service to new technologies will give an alternative way to access information as mobile devices are increasingly becoming popular across college campuses due to high bandwidth infrastructure.

Mobile application can potentially be seen as the next stage in development of online services, where can be access through mobile phone or any portable wireless devices – make the most use the idea of anytime, anywhere. A technology called high-speed Downlink Packet Access (HSDPA) also known as 3.5G enables users to transmit voice, data, and even moving images. In order to realize these services, 3.5G improves the data transmission speed up to 2 Mbps.

1.2 Problem Statement

1.2.1 Problem Identification

Current situation:

This research project arises from the trouble faced by the students when they have to go to the library just to book a discussion room that might have been booked by others. Another investigation is when students rarely able to access the official UTP email to get the remainder about the loaning book and other activities that related to IRC.

Currently, the system that IRC uses is not fully online. Some are still in manual basis, the manual method that IRC are still using are booking the discussion room, booking the auditorium, loaning book and much more. The users have to come to the library to make the booking by themselves.

For the online application that IRC uses is that they use UTP official email to remind their users about the due date of loaning book(s) and to spread information about activities that are related to IRC. However, not all students able to login to their UTP official email due to some technical problem. Therefore, using e-mail is not so effective.

1.2.2 Significance of the Project

This system is as a backup to the current system and perhaps it will be the main system for the students to interact with IRC. With the development of this system, we can breed the accessibility of IRC without limiting the way to connect to the IRC. We can also improve the service of IRC by embedding the idea of providing ‘always on’ accessibility to user. For the beginning, the system only provide user with minimum function such as booking the discussion room and would be enhance as time goes by.

1.3 Objective and Scope of Study

There are several objectives of this project, which are:

- To conduct a study of library middle application on mobile phone

By studying this mobile system, we can use the technology to make university’s life style easier and will have more commodities in accessing the system. This includes the services provided in the system such as the mobile information and many more.

- To develop a middle IRC application

As the current manual system bring difficulties to the user especially the students, by requiring students to go to the library to room the room etc, a mobile system with the same process flows will reduce the complexity that the user currently facing. This new application hopes to boost the communication channel, upgrade the UTP’s life style, enhance the service and improve productivity.

1.3.1 The Relevancy of the Project

The use of mobile phones and handheld devices among youngster or students has been increase each day. Therefore, with the opportunity to implement UTP IRC, Mobile Facility System it can add some more features in the mobile application. However, this project will involve with lots of literature review on the technology used, the limitations and advantages of mobile application, especially for UTP IRC Mobile Facility System. The concept of anytime, anywhere is applied in this project where the students are able to access the IRC wherever they want using the devices like mobile phone. Although there are lots of constraints need to be considered such as cost, it's become an interesting issue in the future as people adapt with the changing of technology.

1.3.2 Project Scope

The Mobile Facilities System will be developed as a mobile version with the same current system scope:

- The study would be on how the mobile application can help the current library system.
- The area of performance work will relate only with current library system
- The main focus is to adopt current system to mobile application

1.3.3 Feasibility of the Project Within The Time Frame

The system will be developed within the time frame:

For this FYP, students are required to undertake two semesters to complete this project. It requires to do research and planning to produce a practical solution. For the part I, the person behind were required to propose a topic according to the given research cluster, the author choose to involve a project under Multimedia & Communication Systems and propose a topic related to Mobile Computing. After topic has been

approved, the author proceed by implementing researches on material related to 3G, library system, mobile library system, Java in 3G and emulator. In the part I, the author also have to provide the progress report (preliminary report) that clarify the author's knowledge about the project. At the end of semester I, the author must submit the interim report by the following week, the student require to presents in font of the committee members about the topic that have been choose. The author has come up with a Gantt chart to plan the research for part I and II (appendix A).

For the normal IT project, the project has been divided into 4 phases according to the SDLC (Software Development Life Cycle) that are planning, analyzing, designing and implementing (appendix B). The Methodology or Project Work will be discussing details in Chapter 3.

CHAPTER 2

LITERATURE REVIEW

Mobile system is an evaluation in term of capacity, data speeds and new service capabilities from second generation mobile network. There are few mobile tools currently used including mobile phones (the latest one provides with 3.5G application), PDAs, game consoles and personal computers and laptops that have wireless capability. The discussion of mobile system could be as below:

“Analog cellular systems are commonly referred as first generation systems. The digital systems currently use such as GSM, PDC, cdmaOne (IS-95) and US-TDMA (IS-136), are second generation systems. Third generation systems are designed for multimedia communication; with the person-to-person can be enhance with high quality images and video, and access to information and services on public and private networks will be enhanced by the higher data rates and new flexible communication capabilities of third generation systems.” [2]

As time goes by, the mobile technologies keep increasing together with the improving of features, quality, and interface to become more user-friendly, interactive, interesting and efficient. Seeing that, more and more new application will be introduce to the mobile user; like accessing the internet using mobile (through Opera Mini V3.1 to allow user to access the internet)

The success of third generation wireless cellular networks is mainly based on an efficient provisioning of the expected wide variety of services requiring different

Quality of Service (QOS) with respect to data rate, delay and error rate. Especially high-speed, high data-rate applications are seen as the most promising tenor of a potential third generation UMTS” [3]

With third generation, all services such as SMS, MMS, streaming, voice, video, WAP, e-mail and web can be provided from packet domain with different QOS. This method may be applied in any application such as downloading file, video, music, and watching broadcast Television etc.

“Today, more than 60 3G/UMTS networks using WCDMA technology are operating commercially in 25 countries, supported by a choice of over 100 terminal designs from Asian, European and US manufacturers. “ [4]

Everywhere we go, we will surely not going to miss to talk about changes in mobile technologies, the functions and features in current market provides. Our country is trying so hard to stand as excellent as other developed country.

“Celcom (Malaysian) Bhd. has integrated 3.5G into its current 3G network, and plans to fully cover peninsular Malaysia with 3.5G by the end of year 2007.” [5]

By exploring the 3.5G application, we can test the boundaries of this technology and make use of it. Applying the 3.5G in campus life, we can provide application such as booking the discussion rooms by students remotely. This system could be a kick start for UTP to develop more on mobile application.

“Specified and implemented as an end-to-end mobile system, 3G/UMTS also features the additional benefits of automatic international roaming plus integral security and billing functions, allowing operators to migrate from 2G to 3G while retaining many of their existing back-office systems. Offering increased capacity and speed at lower incremental cost compared with second generation mobile systems, 3G/UMTS gives

operators the flexibility to introduce new multimedia services to business users and consumers while providing an enhanced user experience.” [4]

These new features such as voice quality, broadband data services like video and multimedia and enhanced roaming not only give benefits to the communication provider for example strengthening customer loyalty but gives advantages to the customer as well. The advantages would be the consistency, security, data integrity, improved accessibility, improved productivity and much more.

CHAPTER 3

METHODOLOGY AND PROJECT WORK

3.1 Methodology

Some general features of prototyping:

- Enables the designer to quickly build or create the data entry form, the menu structure and order and the dialogue styles
- Should be inexpensive to develop – intention is to discard/modify it
- Should not require programming skills

To develop an application on mobile phone, it is best to apply the methodology named incremental prototyping. Incremental prototyping (figure 3.1) is hybrid model that combines the waterfall model and evolutionary approach.

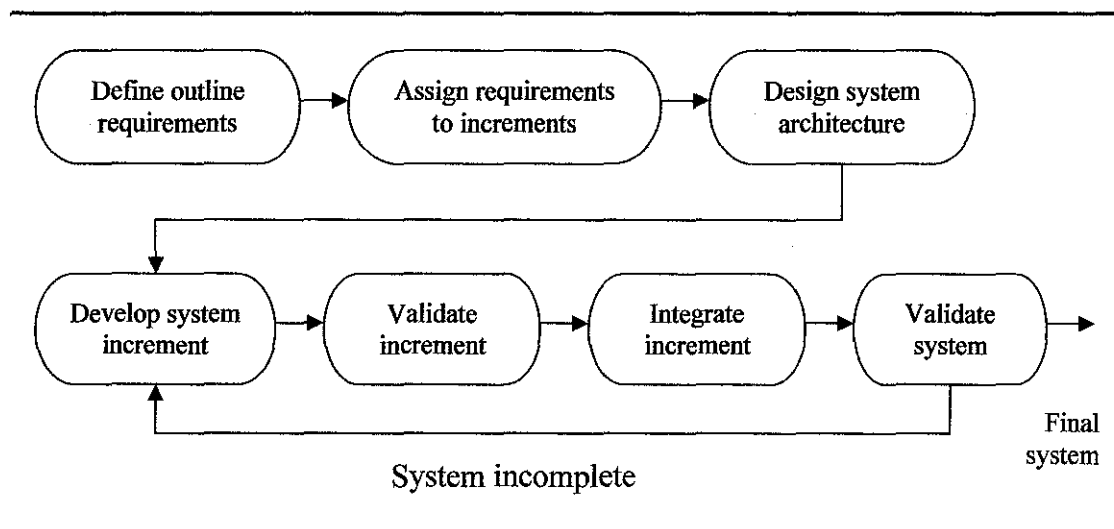


Figure 3.1: Incremental Prototyping

In an incremental prototyping model, the product features are added into each of several prototypes. Typically, development starts with the external features and user interface and then, adds features as prototypes are developed. Requirements and architectural design can be done up front and then each prototype developed as the project progresses.

Few reasons why using this method are:

- Allows large systems to be installed in phases
- Helps to avoid the delays between specification and implementation
- Core system features are provided early
- Users are not overwhelmed with a complex level of functionality in one go
- Suitability and appropriateness of key requirements can be checked
- Less essential features can be added later

This project is very time consuming and need only an individual to develop it, therefore it is suitable to use evolutionary development approach. Evolutionary development is based on the idea of developing an initial implementation, exchanging the idea with supervisor and refining it through many review until an adequate system has been develop (see figure 3.2).

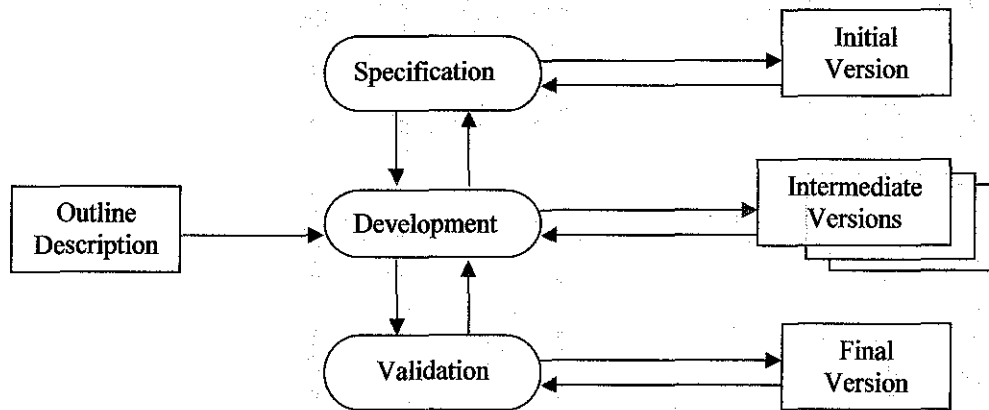


Figure 3.2: Evolutionary Development Approach

As for Evolutionary Development Approach, addition and amendments are made through out the development. Starting from outline description until the final version of the system, the person responsible will get consult from the supervisor to discuss what should be include in the system and what might be impossible to be implement for the period given.

3.2 Project Work

3.2.1 Planning

In the planning phase, the tasks that involved are the project initiation where the student has to select the project topic and come out with a project proposal. The project proposal was submitted to the cluster committee members to evaluate so the topic chosen will meet FYP requirement. The next task will be the project management. This project management task includes analyzing the technical feasibility of the project as well as the organizational feasibility. The tasks that involved are:

- The author went to the IRC to interview some of the staffs about the current system
- Make an observation about the service and website
- Informal survey about the current system and the idea about having mobile facility system for the library.

After the analysis made, the author come out with the preliminary research work where the author need to study on several previous study made on the same project topic or scope that is on the mobile system. All of the materials usually dig up from surveys, articles, journals or books on citizens' acceptance of Mobile Facility System.

3.2.2 Analysis

The next phase that is the analysis phase, the tasks includes developing analysis plan where here the requirements gathering take place. The user requirements will be gathered in various ways such as surveys, interview or discussions. The objectives of this requirement gathering is to ensure that the project developed meet the user satisfaction as well as to see the factors that contributes to the system development. This is the critical phase for developing this project because it requires lots of information to be thrown in the implementation phase. The student analyzes:

- The usage of mobile phone application and what it can offer to end-user
- The current library system
- The 3G/3.5G phones that is available in the market (table 3.1) [6]
- The medium that are going to be use (i.e. J2ME, emulator etc)


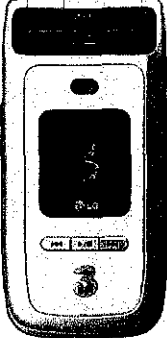
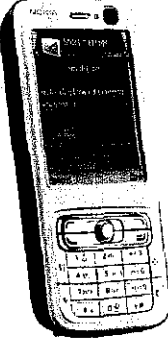
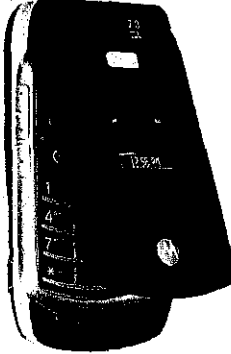
			
<p><i>Sony Ericsson – k800i:</i> Easy for first-time 3G users</p>	<p><i>LG – LG U890:</i> The U890 is a 3G phone, locked to the 3 network. It supports the usual raft of 3G/GSM technologies, including SMS, MMS, Video calling, WAP 2.0, JAVA 2.0, and downloadable content, ranging from games to video and especially music.</p>	<p><i>Nokia – N73:</i> 3G phone features includes Bluetooth 2.0, a Web browser, version 3 of Nokia's Series 60 operating system, a miniSD card slot, MP3 player, stereo FM radio, photo uploading, USB 2.0 connectivity, e-mail and viewers for Word, Excel, Powerpoint, PDF and ZIP files.</p>	<p><i>Motorola – RARZ V3x :</i> The phone is equipped with high speed GPRS (2.5G) and W-CDMA (3G) network data connectivity and there is a built-in WAP browser.</p>

Table 3.1: Examples 3G phone

3.2.3 Design

In the design phase, the programming part takes place but before that, the first task that needs to be completed is the system architectural design. This includes developing the design strategy, the infrastructural design such as the system network model, the hardware and software specifications and also the security plan for the system.

To develop an application on mobile it is best to use J2ME. The reason using J2ME is because the framework cater all kinds of devices (cell phones, screen phones, pagers,

PDA's, car navigation systems), and creating an application using J2ME means that it can be deployed on any of these devices. [7]

To develop the system, it would be easier to use the product that is available on the market. More device manufacturers (i.e. Motorola) are now catching on to this idea and are developing hardware to support the J2ME platform (e.g. mobile phone features 3D games). J2ME is already supported on Palm OS, and some cell phones are available supporting J2ME, with more following in the near future.

Then, the next task will be the user interface design which then followed by the programming management. This will take quite some time as the building source code takes place. After that, then it will be the database design where the functions in the system will be linked to build a complete system.

3.2.4 Implementation

The final phase is the implementation phase. In this phase, testing will be conducted to test the reliability of the system. The testing will use an emulator until there are no changes to be made, and then it will transfer it to phone. The process of emulator is using a PC to emulate the real mobile phone. Finally, the system will be assessed and the study of the user acceptance will be made after the system is completed and tested.

3.3 Development Tools

Tools/Equipment Required

These are the tools that are used throughout the project:

NO	ELEMENTS	TOOLS
1	Documentation	<ul style="list-style-type: none">▪ Microsoft Word▪ Microsoft Power Point
2	Hardware	<ul style="list-style-type: none">▪ Hard disk space 1.5 GB (at least)▪ 1.7 GHz processor or higher▪ 256 MB RAM or higher
3	Software	<ul style="list-style-type: none">▪ J2ME (Java 2 Micro Edition)▪ Wireless toolkit▪ NetBeans IDE Mobility Pack 5.5▪ EMS MySQL

Table 3.2: Tools and Utilities

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Data & Gathering Analysis

4.1.1 Mobile Facility System in supporting library system

UTP IRC, Mobile Facility System is another way of communication channel to the IRC. It has the potential to make the learning environment even more accessible and widely by supporting the current library system. Mobile Facility System can contribute to the improvement that the IRC are currently doing. It offers another prospective to optimize the mobile application.

By the survey that have been collected and observation that have been made, it can said that majority of residents in UTP has a mobile phone and carries it with them most of the time. By this fact the independency of time and space for applying the system is fulfilled to nearly a hundred percent. As a mobile concept is accessing wherever and whenever user's want, user can use at leisure time to access to the IRC. For example: the time user went out for day out and feel like studying after the day out, the user can use the phone to book a room or link it to the M-Learning (further enhance for this system) etc.

Result and discussion focus on the studies that have been done in order to proceed with the design phase in second part of this project. A survey has been conducted to see the respond from the targeted user. Most of the potential user wanted the Mobile Facility

System to be implement in order to make their life in university less stressful (e.g. problems with locker room, loaning books, and network)

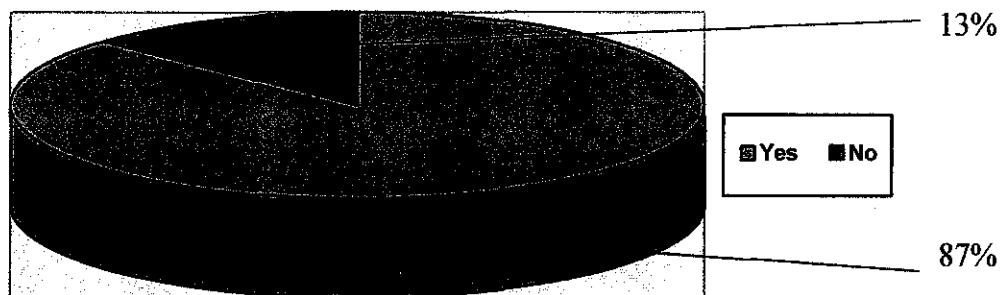


Figure 4.1: Respond students about to implementing the Mobile Facility System

Based on figure 4.1, most of student would like if the Mobile Facility System to be implementing. The student felt that it is good to have such commodity in university life style.

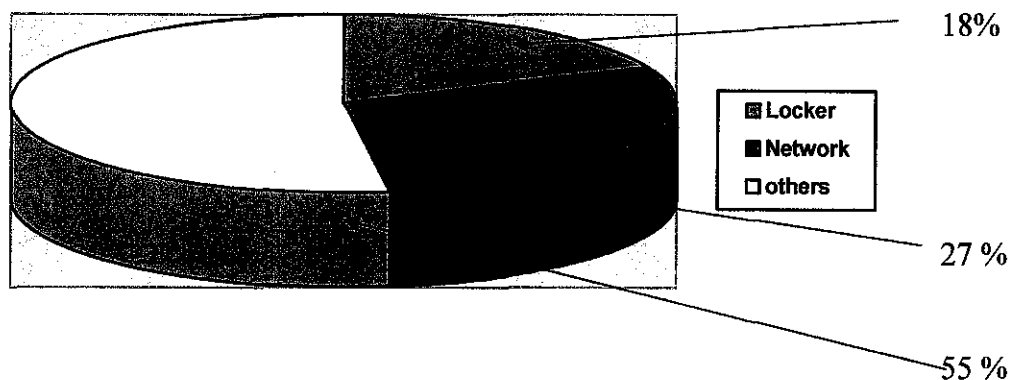


Figure 4.2: Problems with current system

Looking at the figure 4.2, we can design a system that can solve the problem face by the students in UTP.

4.1.2 Advantages of UTP IRC, Mobile Facility System

- *bring in new method:*

With mobile phone, user can access the IRC anywhere from the café to sports complex or from classroom to user's room. Mobile Facility System allows the user to access on any device.

- *Freedom, power, and choice:*

Mobile Facility System permits students can choose where, when, and how they'll gain information from IRC or to study. Mobile Facility System offers new levels of freedom with the ability to exercise control over gaining knowledge patterns.

- *Improve the services:*

The ability to customize new way to interact with IRC is a refresh method that IRC would want to improve their service. Students now were not given any boundary to access to IRC and IRC can upgrade their service by adding new technology.

- *Organized productivity:*

With only a cell phone, handheld device, PDA, or hybrid unit, users can access multiple functions, learn anytime and anywhere. Mobile Facility System offers an efficient way for learners to gain knowledge and information and maximize their time.

4.1.3 Installation process

Getting started with the developing application was quite easy. The NetBeans Mobility Pack for CDC 5.5 provides an environment for rapidly building Java 2 Micro Edition (J2ME) applications that support devices using the Connected Device Configuration (CDC) and Personal computer. The required tools are: Hardware, software, and operating system requirements are detailed in the section 3.3.

The following software was needed to be installed before installing the NetBeans Mobility Pack for CDC 5.5.

- Java SE Development Kit (JDK) 5.0
- NetBeans IDE 5.5

The Sun Java Toolkit for CDC is integrated within the NetBeans Mobility Pack.

Installing the Software

We then need to install the NetBeans Mobility Pack for CDC 5.5. Assume that author have already installed the Java SE Development Kit and the NetBeans IDE 5.5.

To install the NetBeans Mobility Pack 5.5 for CDC:

The default projects directory is C:\Documents and Settings*username (sue)*. If we uninstall NetBeans Mobility Pack for CDC, this directory is not deleted, and will be identified the next time we install the Mobility Pack for CDC.

Installing Emulator Platforms

To develop CDC applications, we need to have the CDC platform registered in the IDE. The default project directory is C:\Documents and Settings \Sue \.netbeans \5.5 \emulators\wtk22_win. (The Sun Java Toolkit for CDC comes integrated with the NetBeans Mobility Pack, so there is no need to download and install this emulator.)

4.2 Discussion

4.2.1 Results

Throughout the research, it is finding that the use of J2ME to develop Mobile Facility System for IRC can be executed. However, each area needs to be research in order to fully understand the application concept and how to integrate it with mobile devices. The following figure will give the reader roughly idea about how the project will integrate within its component.

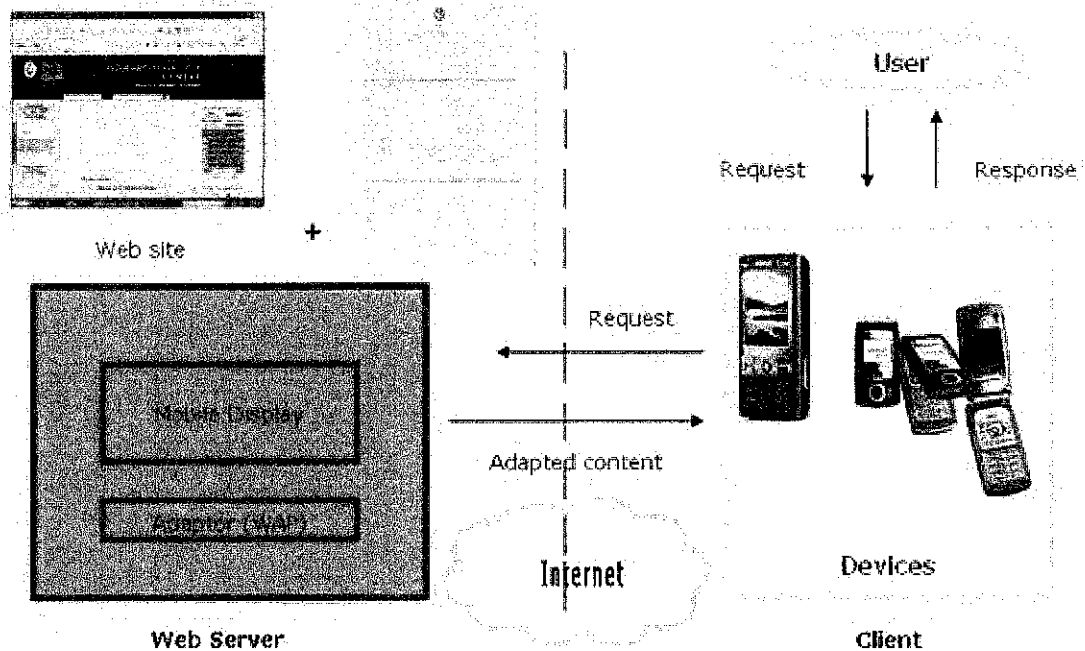


Figure 4.3: System Architecture

Based on the figure above, we can see that the user can use the mobile phone to make a request from the server, for example to book a discussion room. When the process is success, the server will inform to the user and update it into the database.

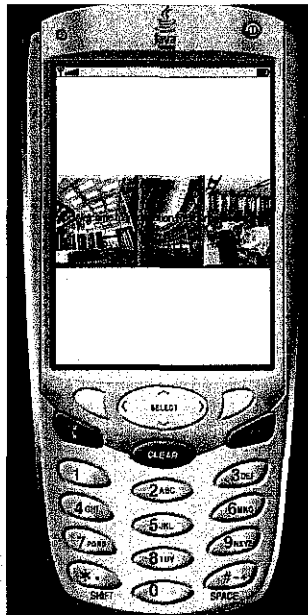


Figure 4.4: Main page of UTP IRC Mobile Facility System

Figure 4.4 above shows the login page of Mobile Facility System for IRC where the welcome its user.



Figure 4.5: the main menu

Figure 4.5 above shows the main menu for the user to choose consist of Basement locker application, book discussion room, UTP e-learning (where it link to m-learning), and OPAC.

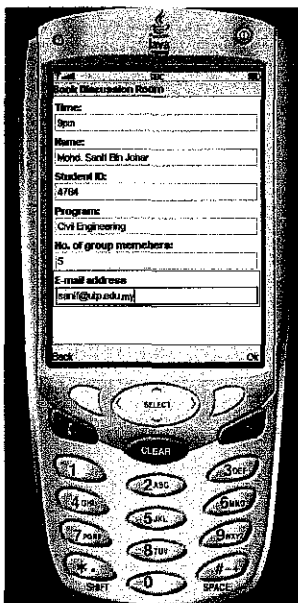


Figure 4.6: Book Discussion room

Figure 4.6 above show the form that the user suppose to key-in in order to book the room



Figure 4.7: Acknowledgement

Figure 4.7 above shows the acknowledgement if the room is available for the user to use. It also tell the user that she/he have completed the booking.

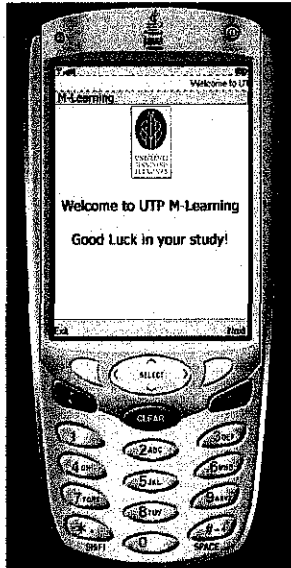


Figure 4.8: M-learning

Figure 4.8 above shows the other function that UTP IRC Mobile Facility System would have.

CHAPTER 5

CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

With the demand of mobile application and increasing usage of mobile phones and handheld devices among teenagers or students, the opportunity of implement Mobile Facility System in academic institution is quite high. However, this project will involve with lots of research on the technology used, the limitations and advantages of Mobile Facility System. The concept of anytime anywhere is apply in this application where the students are able to access the information or knowledge wherever they want using the devices like mobile phone.

Besides, this system provide user with new way of communication style into the current system. The Mobile application enables students to access IRC wherever, whenever whatever they want to. Here in this system, user can choose either to book or use other facilities. This in turn introduces the concept of flexibility, however, its demand new pedagogies, and new approaches to perform service. A user friendly system is achieved by integrating all the research area in the development process.

Although there are lots of constraints need to be considered such as cost, it's become an interesting issue in the future as people adapt with the changing of technology. Mobile application is forecast to be the main system in daily operation. Therefore, as stated in the objectives it is a good start to get to know what is mobile application is all about.

5.2 Recommendations

For future recommendation, it would be best if it could be utilized the features that 3.5G offer which is loading heavy graphics. The suggestion would be enhancing the searching book which is collaborating with OPAC and virtual Reality; VR (shows the route to the shelf of the book). As the previous system is focusing only to fundamental function, in future more functions will be implementing within one system.

For time being, there are few comparative study have been made to show the benefits of using 3.5G instead of using other medium to access the internet. The comparative study is between LAN, 2G and 3G (table 5.1). From the given table, it can conclude that 3G is capable to support for a wide variety of mobile equipment and have flexibility to allow the introduction of new services and technologies.

Features	LAN	2G	3G
Connections:	Support connections only over a range of a few hundred feet	Service are frequently referred to as Personal Communications Service (PCS)	Enable 'follow-me anywhere/always on' telephony concepts
Speeds:	Data rates limited to 100 Mbps	Data rates limited, offering only 10-20 Kbps	Support range from 384 Kbps – 20 Mbps. Support higher bandwidth digital communications.
Exchanging data:	Able to support with email, the web and e-commerce	Cannot send data (i.e. e-mail, files or software)	Provide the ability to transfer both voice data (e.g. making telephone call) and non-voice data (e.g. downloading information, exchanging e-mail, and Instant Messaging (IM))

Table 5.1: Comparison between LAN, 2G and 3G.

Other suggestion would be user's personalization to be included into the mobile system. This personalization enable the user to change the way the system will be displayed in terms of color, font and others based on their preferences.

Lastly, hope this system can give benefits to IRC generally to assist their work and service to their users and also gives more efficient service to students as they are the main user so that they can enjoy the facilities while studying.

5.3 Recommendation From The External Examiner

During the final presentation, the external examiner, Mr. Chen Yau Tang Eugene – the CEO of Actinium Sdn. Bhd. was pleased with the idea to implement the UTP IRC, Mobile Facility System and hope that the author able to complete the functional system and propose it to UTP. Mr. Eugene was also suggested that UTP could provide the equipment for the students to do the testing especially on mobile application.

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APPENDIX

APPENDIX A

Project Timeline and Milestone

Project timeline and Milestone (FYP Part I)																
		1	2	3	4	5	6	7	*8	9	10	11	12	13	14	
1.	Selection of Project Topic	■	■	■												
	• Research on interested topic															
	• Submission of project proposal			●												
	• Topic Approval and Supervisor assigned				●											
2.	Research Class	■	■	■	■	■	■	■								
3.	Requirements analysis and definition				■	■	■	■								
	• Project background identification															
	• Literature review															
	• Project relevancy analysis (survey)															
4.	Submission of Preliminary Report									●						
5.	System design									■	■	■	■	■	■	
	• System architecture															
6.	Submission of Interim Report										●					
7.	Oral Presentation														●	



Process

● Milestone

*8 – Mid-semester Break

Project timeline and Milestone (FYP Part II)

		1	2	3	4	5	6	7	*8	9	10	11	12	13	14
1.	Project Work Continue	■	■	■											
	• Interface Design														
	• Programming and Coding														
2.	Submission of Progress Report I			●											
3.	Project Work Continue				■	■	■	■							
4.	Submission of Progress Report II									●					
5.	Seminar									●					
6.	PreEdx										●				
7.	Submission of Final Report										●				
8.	Maintenance											■	■		
	• Correcting error														
9.	Oral Presentation														
10.	Submission of Project Dissertation													●	●



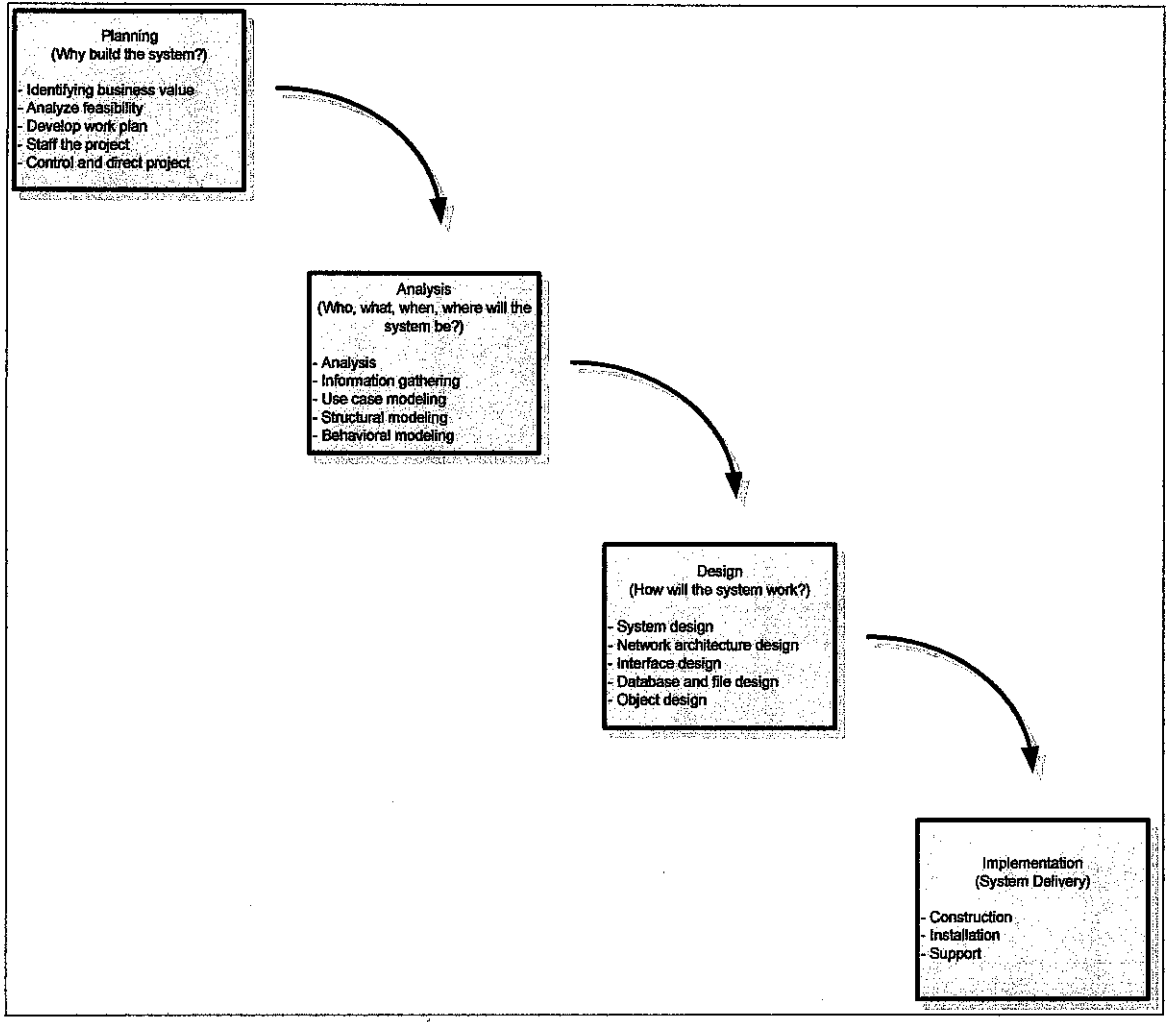
Process

● Milestone

*8 – Mid-semester Break

APPENDIX B

Appendix B

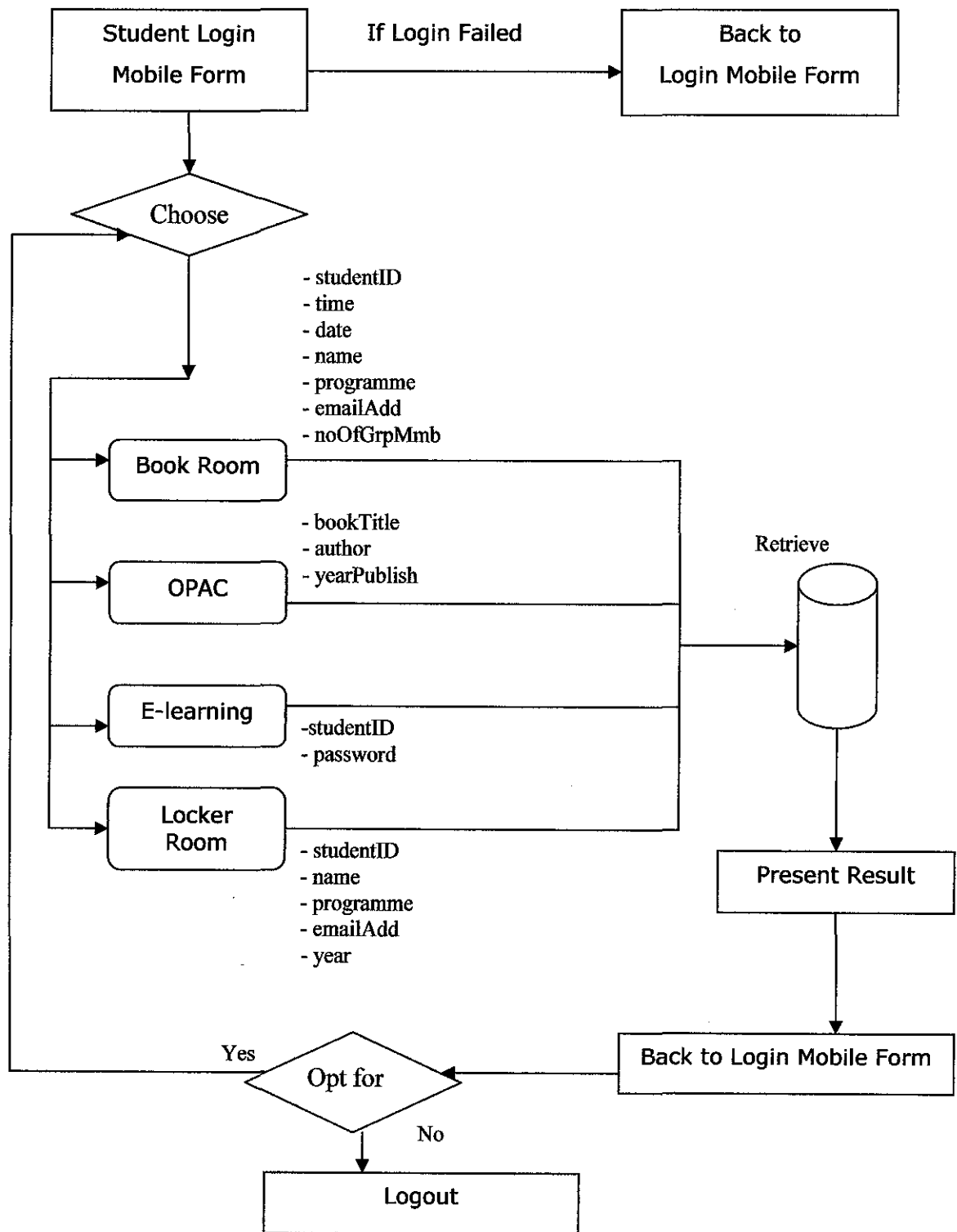


SDLC (Software Development Life Cycle)

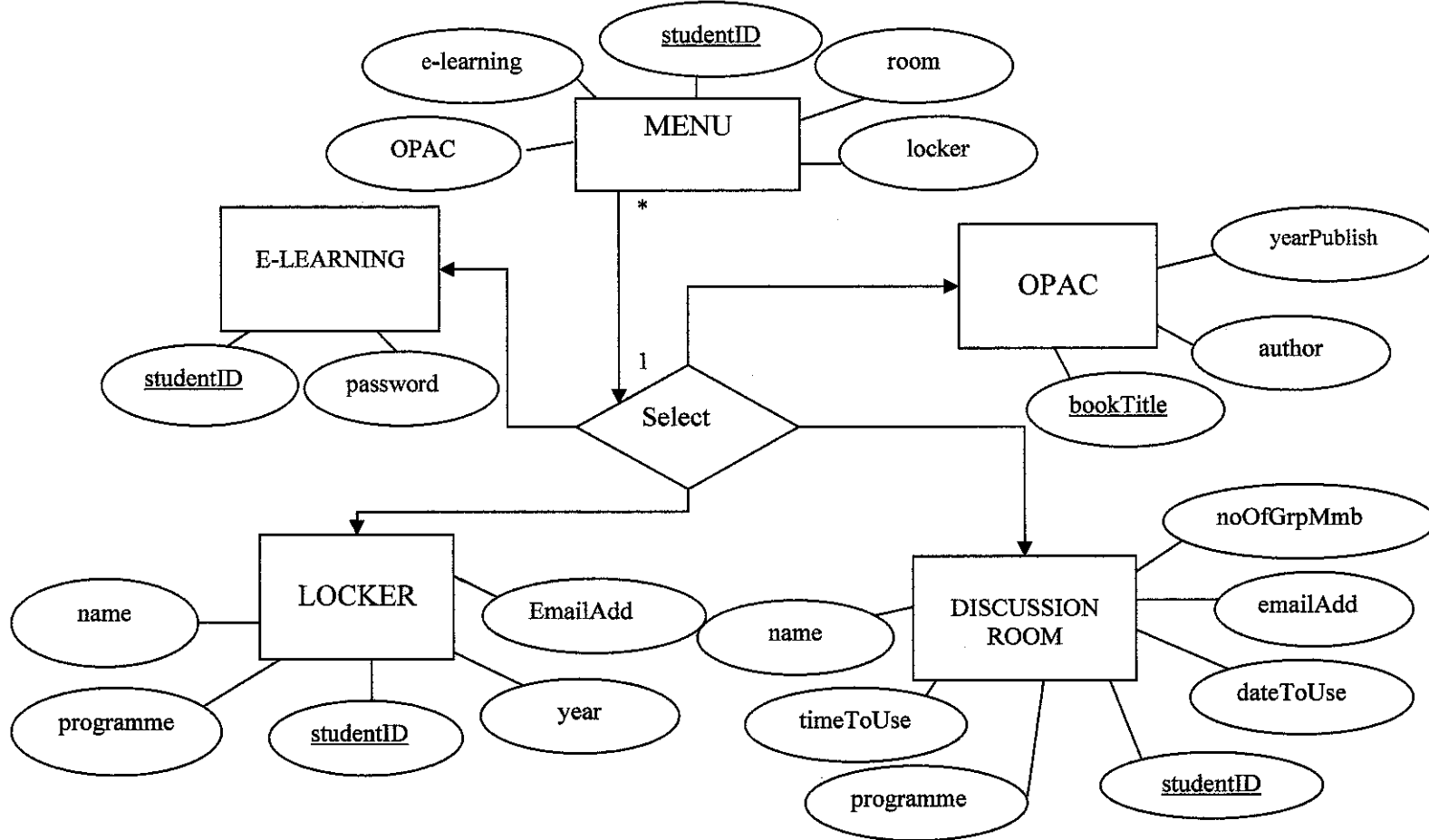
APPENDIX C

Appendix C

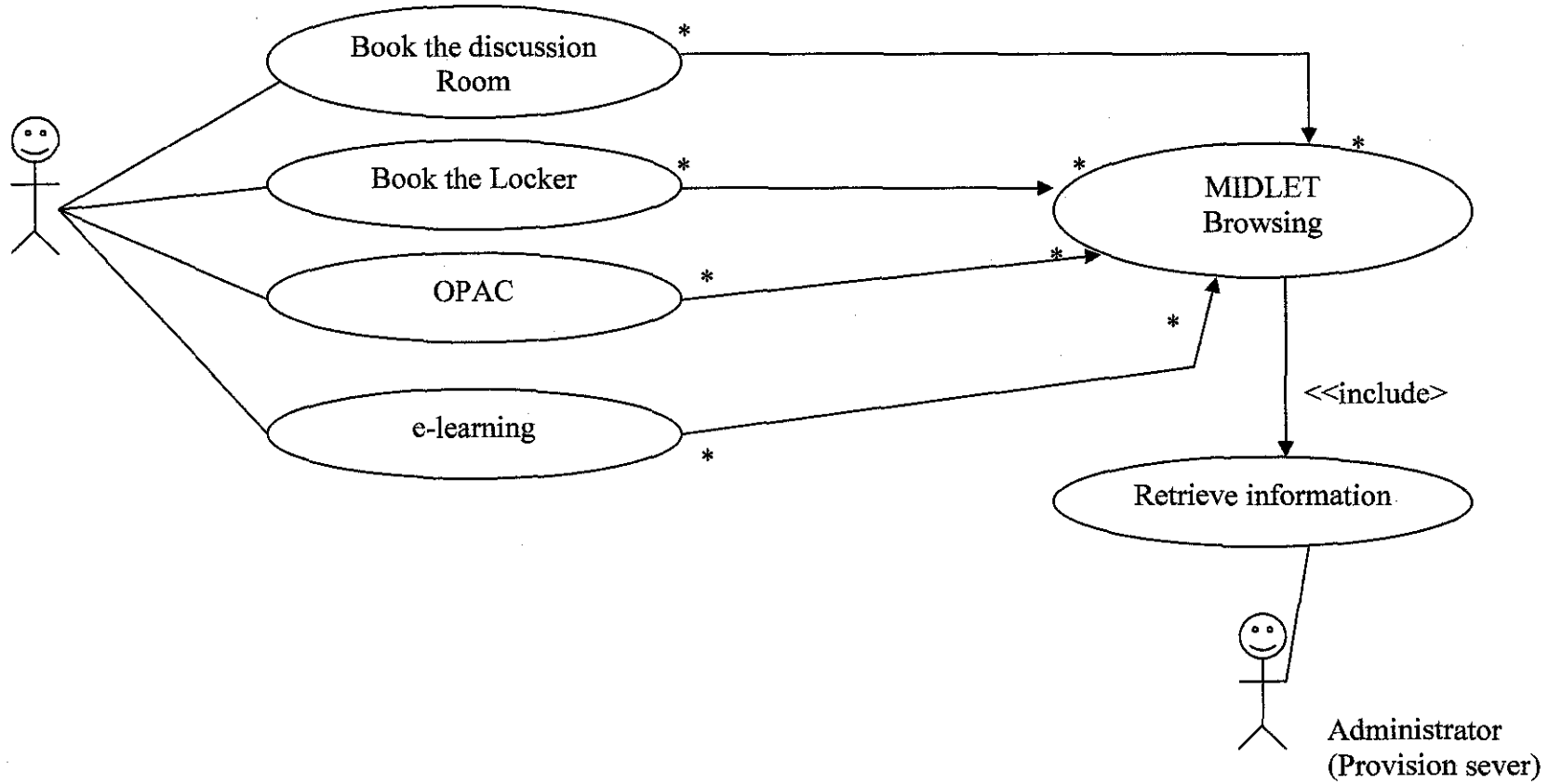
Conceptual Flow model of UTP IRC, Mobile Facility System



ERD (Entity Relationship Diagram) of Mobile Facility System



Use Case Diagram of Mobile Facility System



APPENDIX D

SAMPLE SOURCE CODE FOR UTP IRC, Mobile Facility System

```
import javax.microedition.midlet.*;
import javax.microedition.lcdui.*;

public class myMFacilitiesSystem extends MIDlet implements CommandListener, ItemCommandListener {

    /** Creates a new instance of myMFacilitiesSystem */
    public myMFacilitiesSystem() {
        initialize();
    }
    private org.netbeans.microedition.lcdui.SplashScreen splashScreen1;
    private Form mainMenu;
    private Form discussionRoom;
    private Form locker;
    private Form elearning;
    private Form OPAC;
    private Form form1;

    /** Called by the system to indicate that a command has been invoked on a particular displayable.
     * @param command the Command that was invoked
     * @param displayable the Displayable on which the command was invoked
     */
    public void commandAction(Command command, Displayable displayable) {
        // Insert global pre-action code here
        if (displayable == splashScreen1) {
            if (command == splashScreen1.DISMISS_COMMAND) {
                // Insert pre-action code here
                getDisplay().setCurrent(get_mainMenu());
                // Insert post-action code here
            }
        } else if (displayable == mainMenu) {
            if (command == backCommand1) {
                // Insert pre-action code here
                getDisplay().setCurrent(get_splashScreen1());
                // Insert post-action code here
            }
        } else if (displayable == discussionRoom) {
            if (command == okCommand2) {
                /* DriverManager.registerDriver(new SQLServerDriver());
                 Connection connection = DriverManager.getConnection("jdbc:microsoft:sqlserver://localhost:3306; databaseName=movie", "userName", "password");

                 PreparedStatement qry = connection.prepareStatement("SELECT * FROM book");
                 ResultSet table = qry.executeQuery();

                 while (table.next())
                 {
                 someValue1 = table.getString("someColumn1");
                 someValue2 = table.getDate("someColumn2");
                 }

                 table.close();
                 qry.close();
                 connection.close();
                 */

                getDisplay().setCurrent(get_completed());
                // Insert post-action code here
            } else if (command == backCommand3) {
                // Insert pre-action code here
                getDisplay().setCurrent(get_mainMenu());
            }
        }
    }
}
```

```

        // Insert post-action code here
    }
} else if (displayable == locker) {
    if (command == backCommand4) {
        // Insert pre-action code here
        getDisplay().setCurrent(get_mainMenu());
        // Insert post-action code here
    } else if (command == okCommand9) {
        // Insert pre-action code here
        getDisplay().setCurrent(get_completed());
        // Insert post-action code here
    }
} else if (displayable == elearning) {
    if (command == backCommand5) {
        // Insert pre-action code here
        getDisplay().setCurrent(get_mainMenu());
        // Insert post-action code here
    }
} else if (displayable == OPAC) {
    if (command == backCommand6) {
        // Insert pre-action code here
        getDisplay().setCurrent(get_mainMenu());
        // Insert post-action code here
    }
}

/** This method returns instance for splashScreen1 component and should be called instead of accessing splashScreen1 field directly.
 * @return Instance for splashScreen1 component
 */
public org.netbeans.microedition.lcdui.SplashScreen get_splashScreen1() {
    if (splashScreen1 == null) {
        // Insert pre-init code here
        splashScreen1 = new org.netbeans.microedition.lcdui.SplashScreen(getDisplay());
        splashScreen1.setCommandListener(this);
        splashScreen1.setTitle("Welcome to Mobile Library Facility System");
        splashScreen1.setText("Welcome to Information Resource Center!");
        splashScreen1.setImage(get_image1());
        // Insert post-init code here
    }
    return splashScreen1;
}

/** This method returns instance for mainMenu component and should be called instead of accessing mainMenu field directly.
 * @return Instance for mainMenu component
 */
public Form get_mainMenu() {
    if (mainMenu == null) {
        // Insert pre-init code here
        mainMenu = new Form("Menu", new Item[] {
            get_stringItem1(),
            get_stringItem2(),
            get_stringItem3(),
            get_stringItem4(),
            get_stringItem7()
        });
        mainMenu.addCommand(get_backCommand1());
        mainMenu.setCommandListener(this);
        // Insert post-init code here
    }
    return mainMenu;
}

/** This method returns instance for stringItem1 component and should be called instead of accessing stringItem1 field directly.
 * @return Instance for stringItem1 component

```

```

*/
public StringItem get_stringItem1() {
    if (stringItem1 == null) {
        // Insert pre-init code here
        stringItem1 = new StringItem("1.", "Basement locker application");
        stringItem1.addCommand(get_okCommand4());
        stringItem1.setItemCommandListener(this);
        // Insert post-init code here
    }
    return stringItem1;
}

/** This method returns instance for stringItem2 component and should be called instead of accessing stringItem2 field directly.
 * @return Instance for stringItem2 component
 */
public StringItem get_stringItem2() {
    if (stringItem2 == null) {
        // Insert pre-init code here
        stringItem2 = new StringItem("2.", " Book discussion room\n");
        stringItem2.addCommand(get_okCommand1());
        stringItem2.setItemCommandListener(this);
        // Insert post-init code here
    }
    return stringItem2;
}

/** This method returns instance for stringItem3 component and should be called instead of accessing stringItem3 field directly.
 * @return Instance for stringItem3 component
 */
public StringItem get_stringItem3() {
    if (stringItem3 == null) {
        // Insert pre-init code here
        stringItem3 = new StringItem("3.", " UTP e-learning");
        stringItem3.addCommand(get_okCommand5());
        stringItem3.setItemCommandListener(this);
        // Insert post-init code here
    }
    return stringItem3;
}

/** This method returns instance for stringItem4 component and should be called instead of accessing stringItem4 field directly.
 * @return Instance for stringItem4 component
 */
public StringItem get_stringItem4() {
    if (stringItem4 == null) {
        // Insert pre-init code here
        stringItem4 = new StringItem("4.", "OPAC");
        stringItem4.addCommand(get_okCommand6());
        stringItem4.setItemCommandListener(this);
        // Insert post-init code here
    }
    return stringItem4;
}

/** This method returns instance for discussionRoom component and should be called instead of accessing discussionRoom field directly.
 * @return Instance for discussionRoom component
 */
public Form get_discussionRoom() {
    if (discussionRoom == null) {
        // Insert pre-init code here
        discussionRoom = new Form("Book Discussion Room", new Item[] {
            get_textField14(),

```

```

        get_textField1(),
        get_textField2(),
        get_textField3(),
        get_textField4(),
        get_textField5(),
        get_textField13()
    ));
    discussionRoom.addCommand(get_okCommand2());
    discussionRoom.addCommand(get_backCommand3());
    discussionRoom.setCommandListener(this);
    // Insert post-init code here
}
return discussionRoom;
}

/** This method returns instance for textField1 component and should be called instead of accessing textField1 field directly.
 * @return Instance for textField1 component
 */
public TextField get_textField1() {
    if(textField1 == null) {
        // Insert pre-init code here
        textField1 = new TextField("Time:", null, 120, TextField.ANY);
        // Insert post-init code here
    }
    return textField1;
}

/** This method returns instance for textField2 component and should be called instead of accessing textField2 field directly.
 * @return Instance for textField2 component
 */
public TextField get_textField2() {
    if(textField2 == null) {
        // Insert pre-init code here
        textField2 = new TextField("Name:", null, 120, TextField.ANY);
        // Insert post-init code here
    }
    return textField2;
}

/** This method returns instance for textField3 component and should be called instead of accessing textField3 field directly.
 * @return Instance for textField3 component
 */
public TextField get_textField3() {
    if(textField3 == null) {
        // Insert pre-init code here
        textField3 = new TextField("Student ID:", null, 120, TextField.ANY);
        // Insert post-init code here
    }
    return textField3;
}

/** This method returns instance for textField4 component and should be called instead of accessing textField4 field directly.
 * @return Instance for textField4 component
 */
public TextField get_textField4() {
    if(textField4 == null) {
        // Insert pre-init code here
        textField4 = new TextField("Program:", null, 120, TextField.ANY | TextField.INITIAL_CAPS_WORD);
        // Insert post-init code here
    }
    return textField4;
}
}

```


/** This method returns instance for textField5 component and should be called instead of accessing textField5 field directly.

* @return Instance for textField5 component

*/

```
public TextField get_textField5() {
    if (textField5 == null) {
        // Insert pre-init code here
        textField5 = new TextField("No. of group members:", null, 120, TextField.NUMERIC);
        // Insert post-init code here
    }
    return textField5;
}
```

/** This method returns instance for locker component and should be called instead of accessing locker field directly.

* @return Instance for locker component

*/

```
public Form get_locker() {
    if (locker == null) {
        // Insert pre-init code here
        locker = new Form(null, new Item[] {
            get_stringItem5(),
            get_stringItem6(),
            get_spacer1(),
            get_textField8(),
            get_textField9(),
            get_textField10(),
            get_textField11(),
            get_textField12()
        });
        locker.addCommand(get_backCommand4());
        locker.addCommand(get_okCommand9());
        locker.setCommandListener(this);
        // Insert post-init code here
    }
    return locker;
}
```

/** This method returns instance for elearning component and should be called instead of accessing elearning field directly.

* @return Instance for elearning component

*/

```
public Form get_elearning() {
    if (elearning == null) {
        // Insert pre-init code here
        elearning = new Form("UTP e-learning", new Item[] {
            get_imageItem1(),
            get_textField7()
        });
        elearning.addCommand(get_backCommand5());
        elearning.setCommandListener(this);
        // Insert post-init code here
    }
    return elearning;
}
```

/** This method returns instance for OPAC component and should be called instead of accessing OPAC field directly.

* @return Instance for OPAC component

*/

```
public Form get_OPAC() {
    if (OPAC == null) {
        // Insert pre-init code here
        OPAC = new Form("OPAC", new Item[] {
            get_textField6(),
        });
    }
    return OPAC;
}
```

```

        get_imageItem2()
    });
    OPAC.addCommand(get_backCommand6());
    OPAC.setCommandListener(this);
    // Insert post-init code here
}
return OPAC;
}

/** This method returns instance for full component and should be called instead of accessing full field directly.
 * @return Instance for full component
 */
public TextBox get_full() {
    if (full == null) {
        // Insert pre-init code here
        full = new TextBox("Full ", "Sorry! it's FULL", 120, TextField.ANY);
        full.addCommand(get_backCommand7());
        full.addCommand(get_exitCommand2());
        full.setCommandListener(this);
        // Insert post-init code here
    }
    return full;
}

/** This method returns instance for completed component and should be called instead of accessing completed field directly.
 * @return Instance for completed component
 */
public TextBox get_completed() {
    if (completed == null) {
        // Insert pre-init code here
        completed = new TextBox("Completed!", "Thank you!\nYou may collect the key in the counter before you enter the room.", 120, TextField.ANY);
        completed.addCommand(get_backCommand8());
        completed.addCommand(get_exitCommand3());
        completed.setCommandListener(this);
        // Insert post-init code here
    }
    return completed;
}

/** This method returns instance for backCommand7 component and should be called instead of accessing backCommand7 field directly.
 * @return Instance for backCommand7 component
 */
public Command get_backCommand7() {
    if (backCommand7 == null) {
        // Insert pre-init code here
        backCommand7 = new Command("Back", Command.BACK, 1);
        // Insert post-init code here
    }
    return backCommand7;
}

/** This method returns instance for exitCommand2 component and should be called instead of accessing exitCommand2 field directly.
 * @return Instance for exitCommand2 component
 */
public Command get_exitCommand2() {
    if (exitCommand2 == null) {
        // Insert pre-init code here
        exitCommand2 = new Command("Exit", Command.EXIT, 1);
        // Insert post-init code here
    }
    return exitCommand2;
}
}

```

```

/** This method returns instance for textField6 component and should be called instead of accessing textField6 field directly.
 * @return Instance for textField6 component
 */
public TextField get_textField6() {
    if (textField6 == null) {
        // Insert pre-init code here
        textField6 = new TextField("Service currently under development", "we are sorry, this service are currently under development", 120, TextField.ANY);
        // Insert post-init code here
    }
    return textField6;
}

/** This method returns instance for textField7 component and should be called instead of accessing textField7 field directly.
 * @return Instance for textField7 component
 */
public TextField get_textField7() {
    if (textField7 == null) {
        // Insert pre-init code here
        textField7 = new TextField("Link under development", "We are sorry, this link is under development", 120, TextField.ANY);
        // Insert post-init code here
    }
    return textField7;
}

/** This method returns instance for stringItem5 component and should be called instead of accessing stringItem5 field directly.
 * @return Instance for stringItem5 component
 */
public StringItem get_stringItem5() {
    if (stringItem5 == null) {
        // Insert pre-init code here
        stringItem5 = new StringItem("A1) Locker Fees Per Semester", "a) Deposit (Token & Key) RM40.00\nb) Rental RM25.00\nTOTAL RM65.00");
        // Insert post-init code here
    }
    return stringItem5;
}

/** This method returns instance for stringItem6 component and should be called instead of accessing stringItem6 field directly.
 * @return Instance for stringItem6 component
 */
public StringItem get_stringItem6() {
    if (stringItem6 == null) {
        // Insert pre-init code here
        stringItem6 = new StringItem("A2) Fine RM25.00\nb)Token lost RM15.00\nc) Late return (key & token) RM1.00/day \n after 1 week of semester end date");
        // Insert post-init code here
    }
    return stringItem6;
}

/** This method returns instance for textField8 component and should be called instead of accessing textField8 field directly.
 * @return Instance for textField8 component
 */
public TextField get_textField8() {
    if (textField8 == null) {
        // Insert pre-init code here
        textField8 = new TextField("Name:", "", 120, TextField.ANY);
        // Insert post-init code here
    }
}

```

```

    }
    return textField8;
}

/** This method returns instance for textField9 component and should be called instead of accessing textField9 field directly.
 * @return Instance for textField9 component
 */
public TextField get_textField9() {
    if (textField9 == null) {
        // Insert pre-init code here
        textField9 = new TextField("Student ID:", null, 120, TextField.NUMERIC);
        // Insert post-init code here
    }
    return textField9;
}

/** This method returns instance for textField10 component and should be called instead of accessing textField10 field directly.
 * @return Instance for textField10 component
 */
public TextField get_textField10() {
    if (textField10 == null) {
        // Insert pre-init code here
        textField10 = new TextField("Program:", null, 120, TextField.ANY);
        // Insert post-init code here
    }
    return textField10;
}

/** This method returns instance for textField11 component and should be called instead of accessing textField11 field directly.
 * @return Instance for textField11 component
 */
public TextField get_textField11() {
    if (textField11 == null) {
        // Insert pre-init code here
        textField11 = new TextField("Year:", null, 120, TextField.NUMERIC);
        // Insert post-init code here
    }
    return textField11;
}

/** This method returns instance for textField12 component and should be called instead of accessing textField12 field directly.
 * @return Instance for textField12 component
 */
public TextField get_textField12() {
    if (textField12 == null) {
        // Insert pre-init code here
        textField12 = new TextField("e-mail address:", "", 120, TextField.EMAILADDR);
        // Insert post-init code here
    }
    return textField12;
}

/** This method returns instance for textField13 component and should be called instead of accessing textField13 field directly.
 * @return Instance for textField13 component
 */
public TextField get_textField13() {
    if (textField13 == null) {
        // Insert pre-init code here
        textField13 = new TextField("E-mail address (JTP email address only)", null, 120, TextField.ANY);
        // Insert post-init code here
    }
    return textField13; }
}

```

APPENDIX E

Hi guys! I'm currently working on my FYP to develop a system for IRC using mobile phone. Hope you can help me by answering the questions below;

1. How do you rate the facilities in IRC? (rate from poor to excellent; 1-5)

4

2. How often do you surf the IRC website?

- Everyday
- Few times/once in week
- Once a month
- Never



3. Do you have difficulty to book the carrier room? (e.g. the room have been booked when you come to the library). (Yes/No)

Yes

4. Is there any other difficulty you face with the current library facilities? Or any comment(s)? (e.g. problems with OPAC, locker, loan book, etc.)

locker

5. Have you heard about mobile system? (Yes/No)

Yes If yes, any example(s)? m-learning

6. Would you like to have a mobile system for IRC to enhance the facilities?

(Yes/No)
Yes

7. If the mobile system in the library is going to be implemented, do you have any suggestion to make it more efficient? (e.g. features, functions, etc)

Book locker warning

Thanks guys! ☺

No: 7

Hi guys! I'm currently working on my FYP to develop a system for IRC using mobile phone. Hope you can help me by answering the questions below;

1. How do you rate the facilities in IRC? (rate from poor to excellent; 1-5)

4

2. How often do you surf the IRC website?

- Everyday
- Few times/once in week
- Once a month
- Never



3. Do you have difficulty to book the carrier room? (e.g. the room have been booked when you come to the library). (Yes/No)

Yes

4. Is there any other difficulty you face with the current library facilities? Or any comment(s)? (e.g. problems with OPAC, locker, loan book, etc.)

Long queue to borrow a book and due to the server's failure

5. Have you heard about mobile system? (Yes/No)

Yes If yes, any example(s)? m-learning

6. Would you like to have a mobile system for IRC to enhance the facilities?

(Yes/No)
Yes

7. If the mobile system in the library is going to be implemented, do you have any suggestion to make it more efficient? (e.g. features, functions, etc)

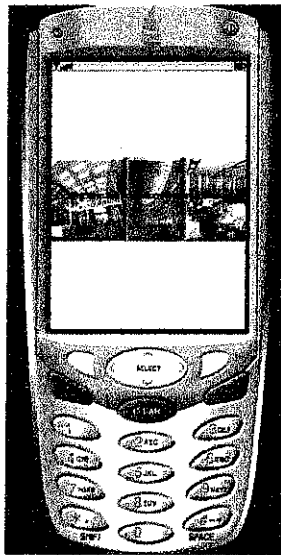
can renew book

Thanks guys! ☺

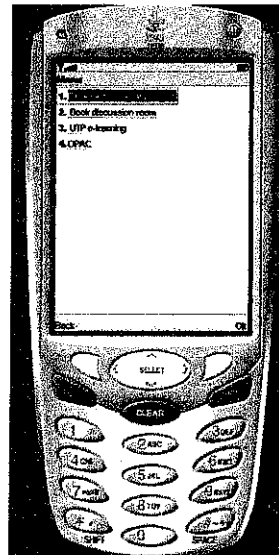
No: 3

I am collecting a respond about my system to see the acceptance or to see any suggestion to improve the system. Hopefully, with your cooperation of answering these questions, will help me to enhance the system and contribute to IRC to improve the quality services that is available at the IRC.

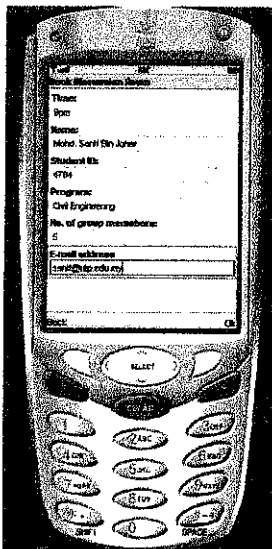
The screen-shot of the system (prototype):



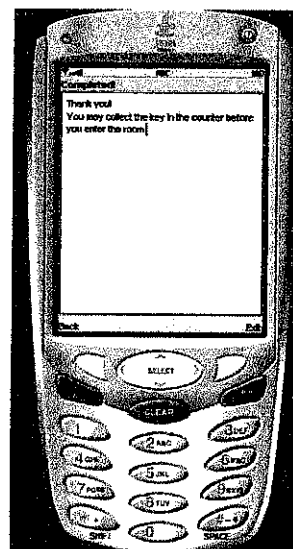
Main Page



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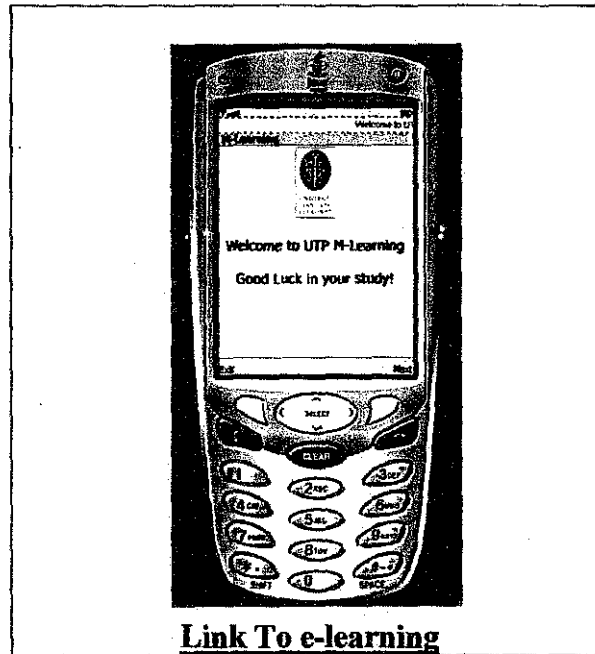


Discussion Room Booking Form



Acknowledgement

UTP IRC, Mobile Facility System

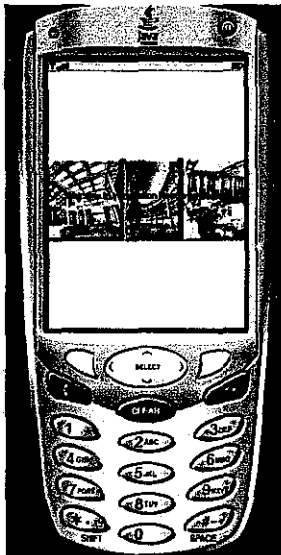


1. What do you think about the interface?
..The interface is simple and easy to understand & interesting.
2. What do you think about this system?
..Good and save time.
3. Do you think this system is user-friendly? (Y/N)
Yes
4. In your opinion, will mobile system help any current system in the future?
Yes
5. In your opinion, will mobile phone be the main gadget to assist our work task in the future?
Yes
6. Do you think this system can help IRC to improve the quality service?
Yes because students can access from outside.
7. What other area that IRC want to improve the quality service?
Check in and check out books or document faster.
8. Do you have any comment/suggestion to improve this system?
No

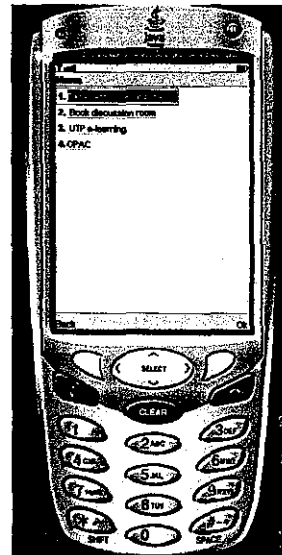
UTP IRC, Mobile Facility System

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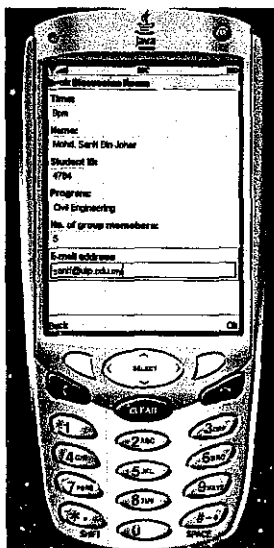
The screen-shot of the system (prototype):



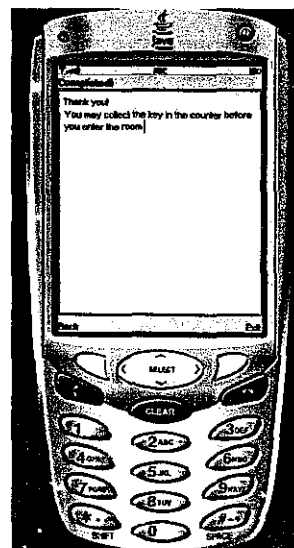
Main Page



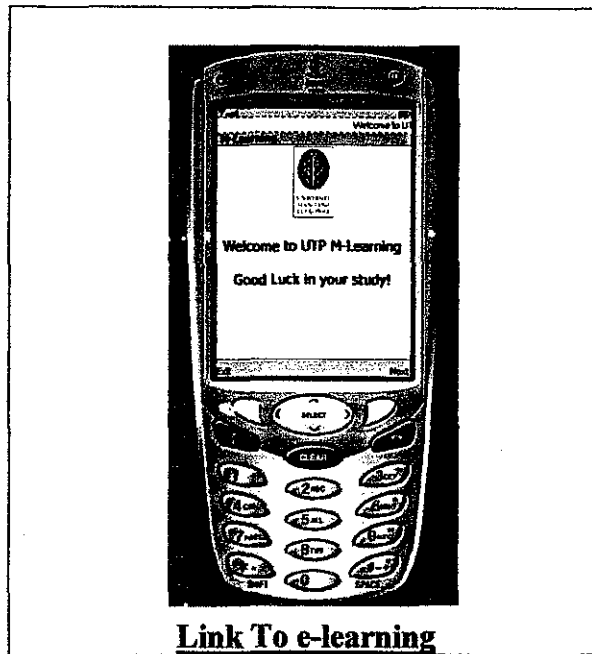
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Discussion Room Booking Form



Acknowledgement



1. What do you think about the interface?
User-friendly, simple, easy to use
2. What do you think about this system?
Helpful, beneficial for digital/mobile library services
3. Do you think this system is user-friendly? (Y/N)
4. In your opinion, will mobile system help any current system in the future?
Yes
5. In your opinion, will mobile phone be the main gadget to assist our work task in the future?
Yes
6. Do you think this system can help IRC to improve the quality service?
Yes
7. What other area that IRC want to improve the quality service?
Users account, fine, online databases, marketing/e-flash
8. Do you have any comment/suggestion to improve this system?
Secure services (have to provide account/matrix no)

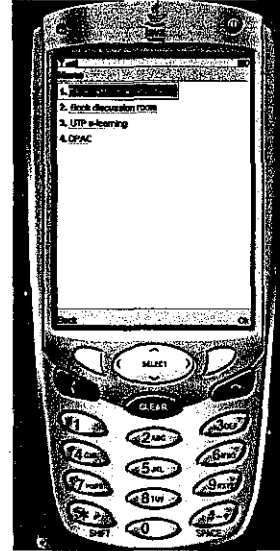
UTP IRC, Mobile Facility System

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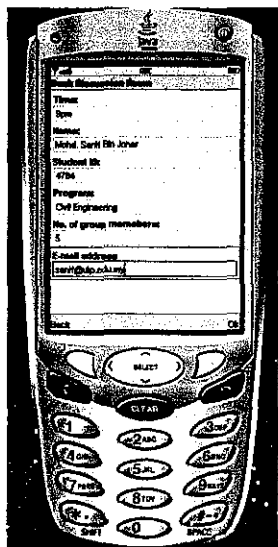
The screen-shot of the system (prototype):



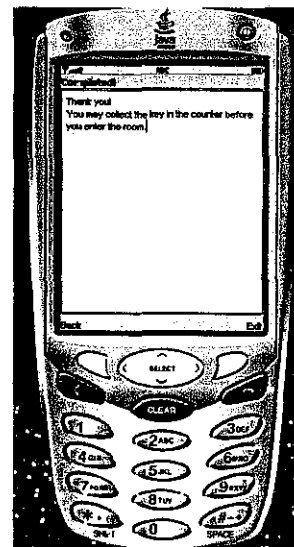
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Discussion Room Booking Form



Acknowledgement