

MOBILE STAFF INFO

by

Zurial Azrique bin Abdul Rahman

Dissertation submitted in partial fulfillment of
the requirements for the Bachelor of Technology (HONS)
(Information Technology)

May 26, 2006

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1) Local area networks (computer networks)
2) Wireless communication systems
3) ...

CERTIFICATION OF APPROVAL

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Approved by,

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CERTIFICATION OF ORIGINALITY

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



(ZURIAL AZRIQUE BIN ABDUL RAHMAN)

ABSTRACT

This report will explain on the basis of the final year project of developing an application for mobile staffs using personal data assistant (PDA) and notebooks. Named as '**Mobile Staff Info**', the author aims to create an application for mobile staffs that compromises of the basic procedures (such as to apply leave or promotion) that are usually done manually in the office; that are time consuming. This report contains the background of study of the project, its problem statement, objective and scope of study, literature review and theory, methodology, and lastly the conclusion of the project. Basically the problem of the current procedures are they are done manually using papers, thus this will obviously consumes a lot of time especially in a big company that may have staffs applying for their requests simultaneously at the same time. Mobile staffs that used these manual procedures will be affected, as it is not efficient and time consuming; since time management is very crucial for them. The scope of this project is to do a research on the reliability of the proposed application. This study will be performed in Universiti Teknologi Petronas (UTP) campus and aims at several staffs of UTP as the target users. The methodology of this project is incremental model which is under iteration model architecture. This model will help to identify problems and also the services that need to be included in the application. For the conclusion, the author has reviewed back about the proposed application in the context of efficiency and reliability to users.

ACKNOWLEDGEMENT

I would like to express my appreciation and gratitude to those that supported me and helped me during the good and tough times in developing the MSI program. First and foremost, I would like to express my fullest gratitude to Allah S.W.T. God Almighty in giving me the strength and confidence to carry out and complete the tasks and projects scheduled to me, and to my parents, thanks for being there for me and support me during my FYP project.

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Last but not least, I thank my colleagues for their helpful support in completing this project. Their ideas and comments have contributed to the success of development in this project.

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ABBREVIATIONS

FYP	:	Final Year Project
GPRS	:	General Packet Radio Service
GSM	:	Global System for Mobile Communications
GUI	:	Graphical User Interface
HRM	:	Human Resource Management
ICC	:	Internal Customer Complaints
J2ME	:	Java 2 Micro Edition
LAN	:	Local Area Network
MS	:	Mobile Station
MSI	:	Mobile Staff Info
PDA	:	Personal Data Assistant
WIFI	:	Wireless Fidelity

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

1.1.1 Wireless Fidelity (WiFi)

This project will be using Wireless Fidelity (WiFi) as the medium to enable the proposed application to work. WiFi is a trademark for sets of product compatibility standards for wireless local area networks (WLANs). WiFi was intended to allow mobile devices, such as laptop computers and PDAs to connect to local area networks, but is now often used for Internet access and wireless VoIP phones. Desktop computers can also use WiFi, allowing offices and homes to be networked without expensive wiring. Most computers are sold today with WiFi built-in; others require adding a WiFi network card.

WiFi enabled devices are able to connect to a local area network when near one of the network's access points. The connection is made by radio signals; there is no need to plug the device into the network. If the local area network is connected to the Internet, the WiFi device can access the Internet as well. The geographical region covered by one or several access points is called a hotspot. The range of an access point varies. The access point built into a typical WiFi home router might have a range of 45m indoors and 90m outdoors. WiFi is based on the IEEE 802.11 specifications. There are currently four types of 802.11 variations which are 802.11a, 802.11b, 802.11g, and 802.11n. The table of comparison is as below:

Specifications	Speed	Frequency Band	Compatible with
802.11b	11 Mb/s	2.4 GHz	b
802.11a	54 Mb/s	5 GHz	a
802.11g	54 Mb/s	2.4 GHz	b, g
802.11n	100 Mb/s	2.4 GHz	b, g, n

Table 1 – Comparison between four types of 802.11 variations

The advantages of using WiFi are as listed below:

- Unlike packet radio systems, WiFi uses unlicensed radio spectrum and does not require regulatory approval for individual deployers.
- Allows LANs to be deployed without cabling, potentially reducing the costs of network deployment and expansion. Spaces where cables cannot be run, such as outdoor areas and historical buildings, can host wireless LANs.
- WiFi products are widely available in the market. Different brands of access points and client network interfaces are interoperable at a basic level of service.
- Competition amongst vendors has lowered prices considerably since their inception.
- Many WiFi networks support roaming, in which a mobile client station such as a laptop computer can move from one access point to another as the user moves around a building or area.
- Many access points and network interfaces support various degrees of encryption to protect traffic from interception.
- WiFi is a global set of standards. Unlike cellular carriers, the same WiFi client works in different countries around the world (although may require some software configuration).

The setup for wireless router in WiFi architecture can be divided into three types which are:

- Root unit on a wired LAN

An access point connected directly to a wired LAN provides a connection point for wireless users. If more than one access point is connected to the LAN, users can roam from one area of facility to another without losing their connection to the network. As users move out of range of one access point, they automatically connect to the network (associate) through another access point. The roaming process is seamless and transparent to the user.

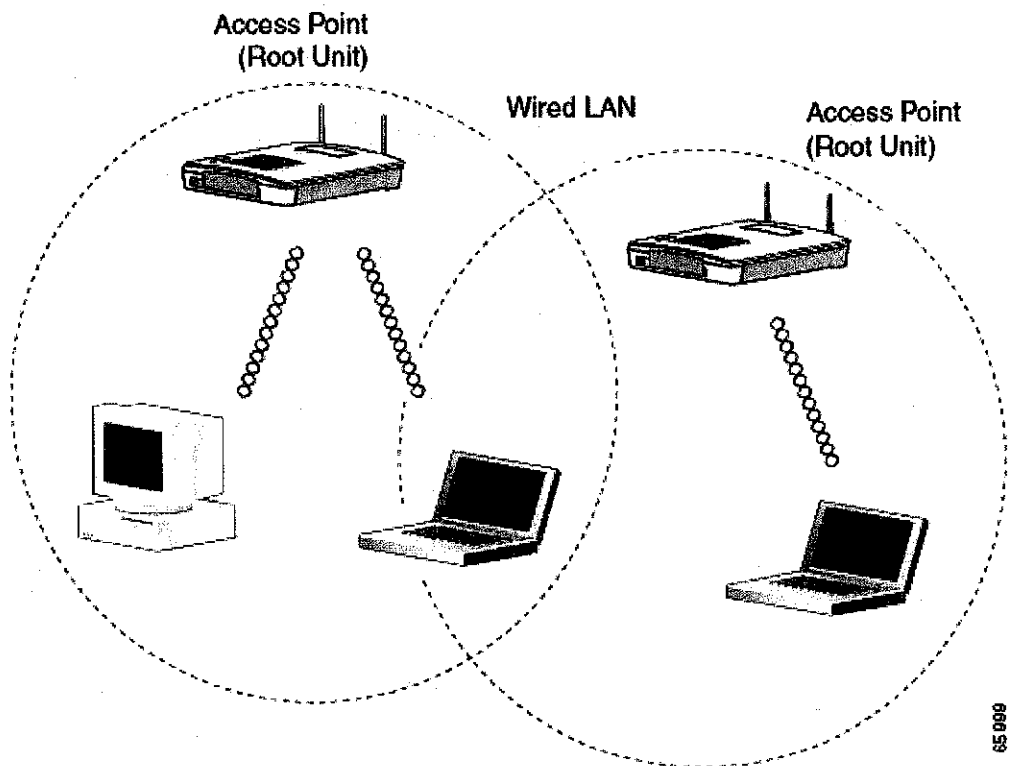


Figure 1.1 – Root unit on a wired LAN

- Repeater unit that extends wireless range

An access point can be configured as a stand-alone repeater to extend the range of the wireless infrastructure to overcome an obstacle that blocks radio communication. The repeater forwards traffic between wireless users and the wired LAN by sending packets to either another repeater or to an access point connected to the wired LAN. Data is sent through the route that provides the best performance for the client.

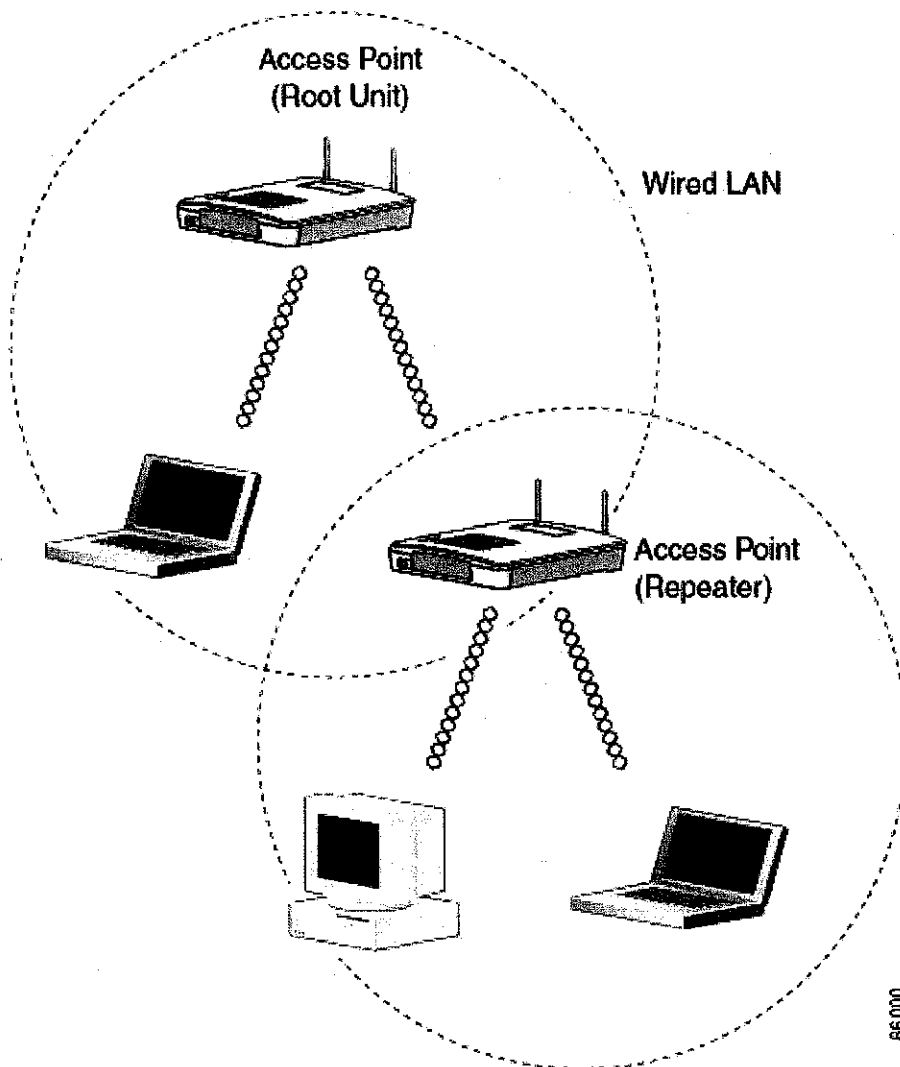


Figure 1.2 - Access point as repeater

- Central unit in all-wireless network

In an all-wireless network, an access point acts as a stand-alone root unit. The access point is not attached to a wired LAN; it functions as a hub linking all stations together. The access point serves as the focal point for communications, increasing the communication range of wireless users.

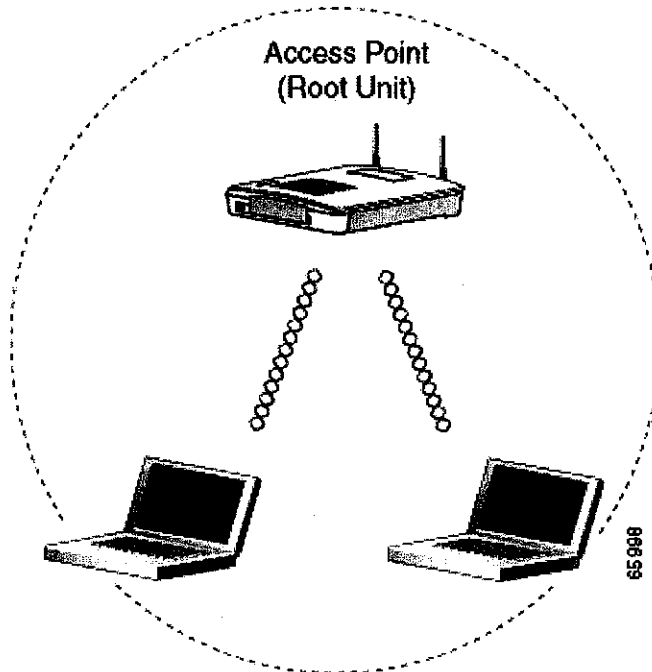


Figure 1.3 – Access point as a central unit in all-wireless network

1.1.2 Personal Data Assistant (PDA)

The proposed application will be using Personal Data Assistant (PDA) as the peripheral device. PDAs are ideally suited for mobile users that integrate multiple applications and also changes can be made to personalize each PDA to meets users' needs. The basic functions in a PDA are functions of an organizer (notepad, address book, calendar), office applications (presentation, documentation, spreadsheet) and also with communication abilities (fax, modem, e-mail, beam).

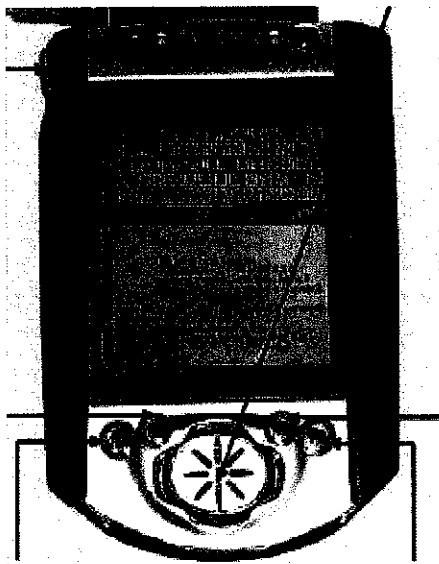


Figure 1.4 – Personal data assistant (PDA)

PDA is an alternative for users to do their works or to be online other than using desktop computers or notebooks. PDA provides mobility and usability with some of the capabilities of a computer. A PDA can be operated in any position whether the user is walking or standing thus this provides portability to users especially mobile users that needs be mobile at most of their time to do their works.

A PDA with WiFi capabilities can connect to the wireless network architecture or hot spots to be online or using the intranet in that radius area of signal transmission. Thus, PDA is the most suitable device to be used in this project in order to meet the objective of the application itself that is mobility.

1.2 PROBLEM STATEMENT

With firms now dependant on IT for the day-to-day running of their business processes, there is a growing need for staff to have access to information systems and corporate data from anywhere, whether on the company site, at customer premises, or on the road.

Going mobile requires the selection of suitable client hardware, the provisioning of adequate communication links, and often the use of middleware to tie together the mobile platform with the company's existing systems. The term mobile worker covers a wide range of jobs, including traveling sales executive, field service engineer, courier, surveyor, and many other more.

Being mobile is a problem to mobile staffs especially if they are in need of information or requests and they don't have the option to be informed with such information and to do some of the requests requires them to do it manually according to the work procedures. Such information is the company bulletin that includes news and announcements, duty rosters, incidents, condolences, meetings and etc.

Manual procedures (job promotion, request for transferring to another place or departments, applying for leave, etc) in the other hand require them to be in their workplace, by means in a specific place such as the administration building. This is surely is not feasible for mobile staffs when time is crucial at that time because manual procedures are time consuming to be processed manually.

To overcome this matter, developing an application that can be accessible by mobile staffs is important. This application should be accessible with the usage of multiple peripherals such as desktop computers, notebooks and PDAs. This is also a significant element where office staffs can also use the application online.

1.3 OBJECTIVE AND SCOPE OF STUDY

The objective of the proposed application is to assist staffs especially mobile staffs to be informed and also inform other staffs of any important news or updates happening in their workplace. It is also to reduce the hassles and hectic conventional manuals of working procedures that uses papers (such,as applying for leave) by integrating the manuals in the application itself.

This application will be feasible to mobile users as it is mobile (using PDA or notebooks) and the convenience to use it no matter where the staffs are as long they are in the radius of the signal transmission of the wireless routers or access points. The application will also facilitate the company by including an extra element that is the Internal Customer Complaint (ICC) for staffs to give ideas or complaints to improve the company.

The scope of study or area for the time being is to determine the efficiency of the application to users. The study will be performed in Universiti Teknologi PETRONAS campus with some students and lecturers as the target users. Analysis will be done and will be included in the Interim Report later in the progress of this project.

The hypothesis of this project is the proposed application is helpful to solve problems and overcome limitations of conventional working procedures.

CHAPTER 2

LITERATURE REVIEW AND THEORY

Based on the journal of Towards QoS-Awareness of Context-Aware Mobile Applications and Services by Katarzyna Wac (University of Geneva, CUI/OSG group):

The emergence of new wireless broadband networks and diverse miniaturized and personalized networked devices, give rise to variety of new mobile services in our daily life. Ultimately, these mobile services are executed as we move: in different places, at different time and under different conditions. Hence, these services get a continuously changing information flow from their execution environment. The management of this flow becomes vital for mobile services delivery. This means a communication paradigm needs to shift from any time and any place into the right time in the right way.

Based on the journal of The Interoperability of Wi-Fi Hotspots and Packet Cellular Networks and the Impact of User Behavior by Dilip Antony Joseph, B. S. Manoj, and C. Siva Ram Murthy (Indian Institute of Technology Madras):

The advantages of WiFi systems are ease-of-use, ubiquitous high speed computing, and low setup/deployment cost. The integration of WiFi hotspots (wireless LANs) with the wide area wireless networking technologies such as Global System for Mobile Communications (GSM) and General Packet Radio Service (GPRS) provides added advantages of large coverage and uninterrupted service for the mobile stations (MSs).

CHAPTER 3 METHODOLOGY

3.1 PROCEDURE IDENTIFICATION

The selected methodology that will be used to conduct this project is the process iteration model which is the incremental development model. The purpose to use this methodology is to reduce reworks in the development process and to give time for delay decisions on the requirements to have more experience in developing the application.

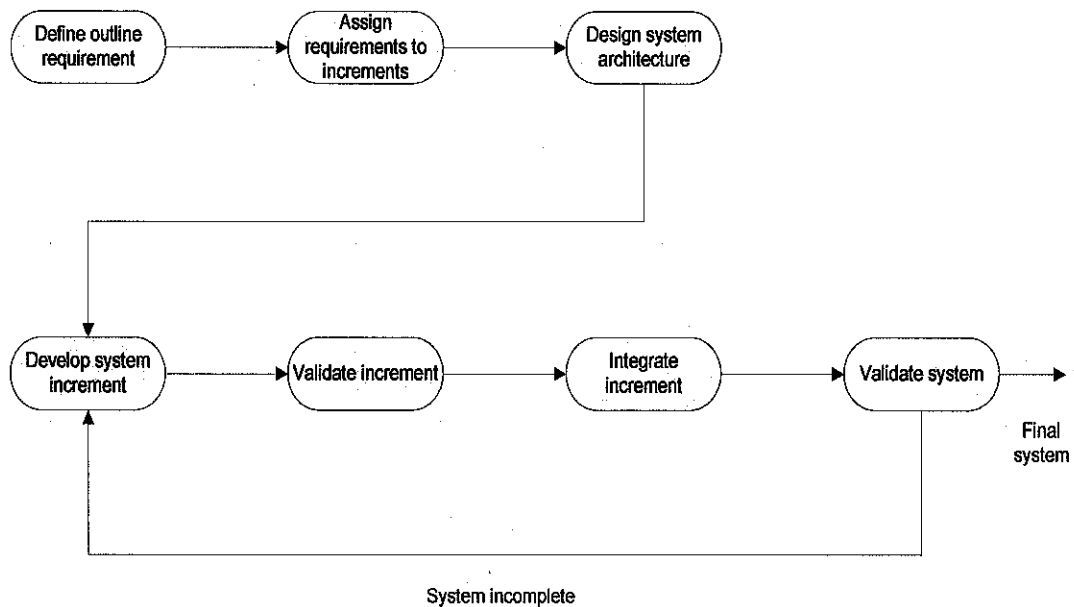


Figure 3.1 - Incremental Development Stages

- **Define outline requirement**

For this incremental development model, the services or features that will be included as the important requirements in the application will be identified.

- **Assign requirements to increments**

A number of delivery increments are defined with their own specific requirements which each increment as the subset of the system functionality.

- **Design system architecture**

The architecture of the system is then defined depending on the requirement priority of the system increments. The highest priority will be delivered first in developing this application.

- **Develop system increment**

System increments will be developed accordingly to their priority. Further requirement analysis for later increments can take place but requirements changes for the current increment at that time will not be accepted.

- **Validate increment**

The validation of each increment takes place where the increments will be checked to match their requirements.

- **Integrate increment**

Once the increments has been completed and validated, integration of these increments to put into a single system or application will be done. This will improve the system functionality as there will be some changes that may occur throughout the integration process.

- **Validate system**

Evaluation will be done to clarify the system requirements for later increments (if any) and for the later versions of the application.

3.2 TOOLS

The tools that will be used in developing this application are as listed below. The list includes hardware and software development tools.

- Server : Desktop computer
- Client : Personal Data Assistant (PDA), Smart phone, Hand phone
- Programming : Net Beans 5.0 IDE, Java 2 Micro Edition (j2me)
- Database : mySQL

CHAPTER 4

RESULTS AND DISCUSSION

4.1 MOBILE STAFF INFO ARCHITECTURE

4.1.1 System Overview

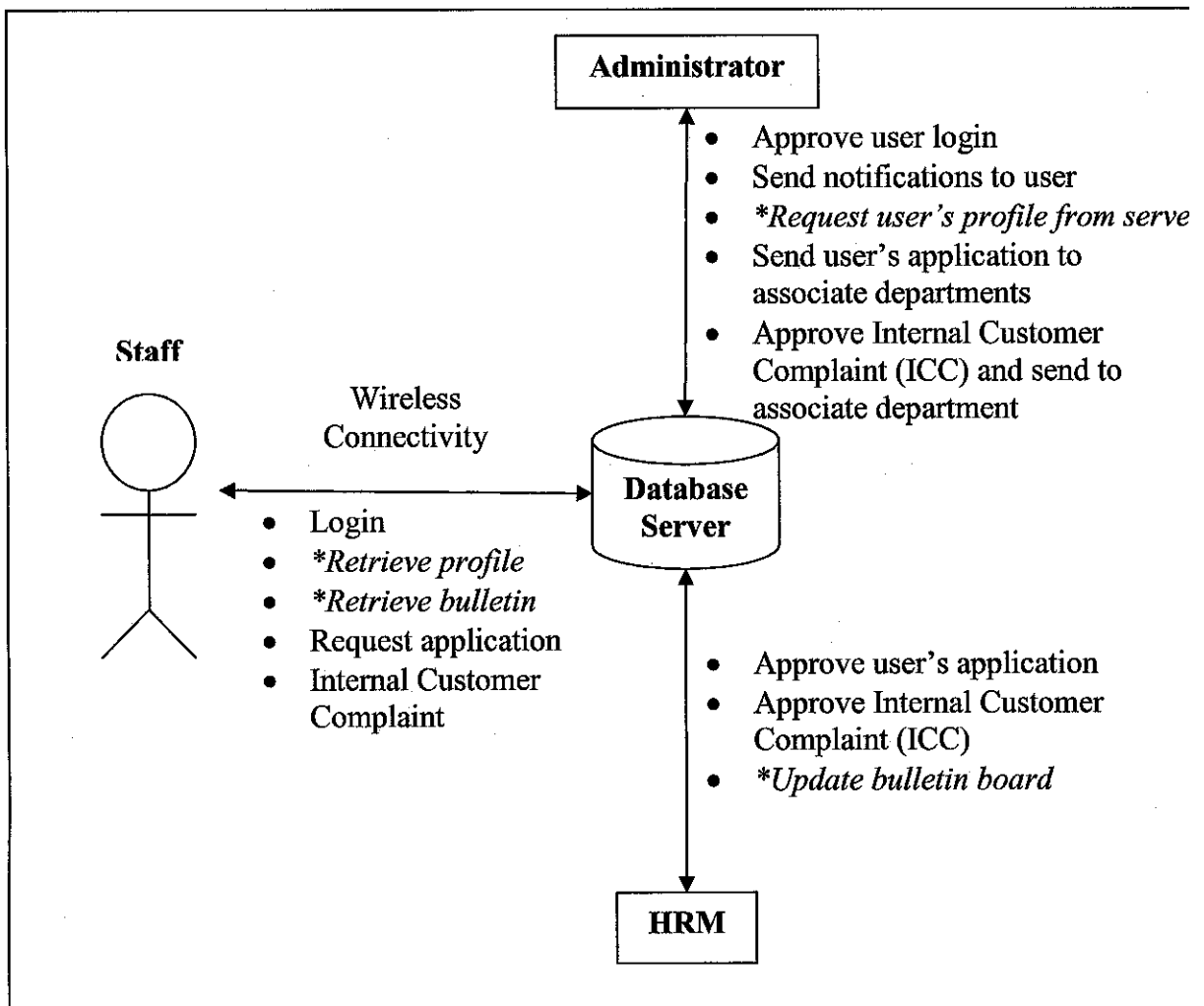


Figure 4.1 - System Architecture – Overview

* Will not be included in the final product

4.1.2 Detail view

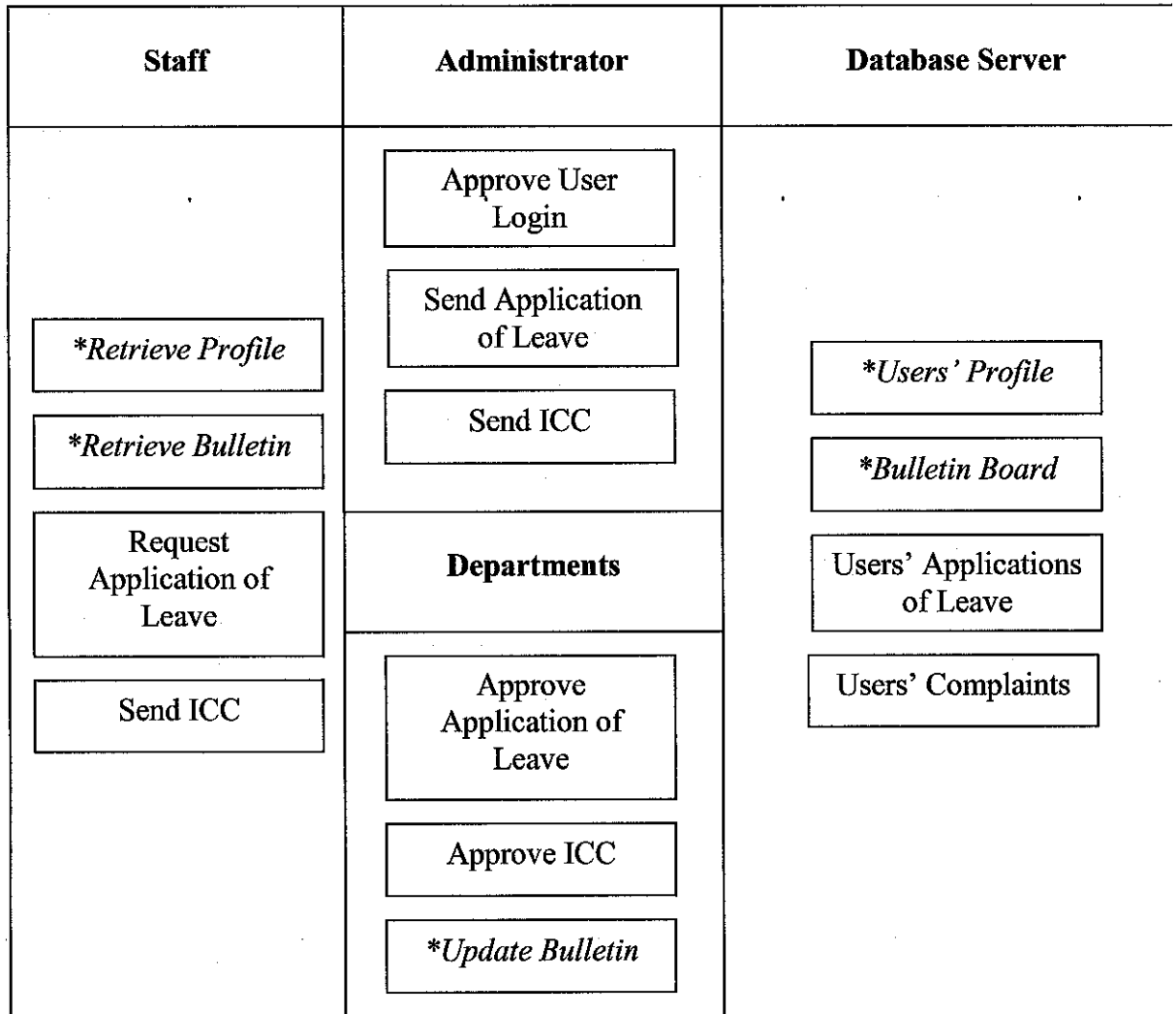


Figure 4.2 - System Architecture – Detail View

** Will not be included in the final product*

4.1.3 System Workflow

This is the current system workflow for the developed system

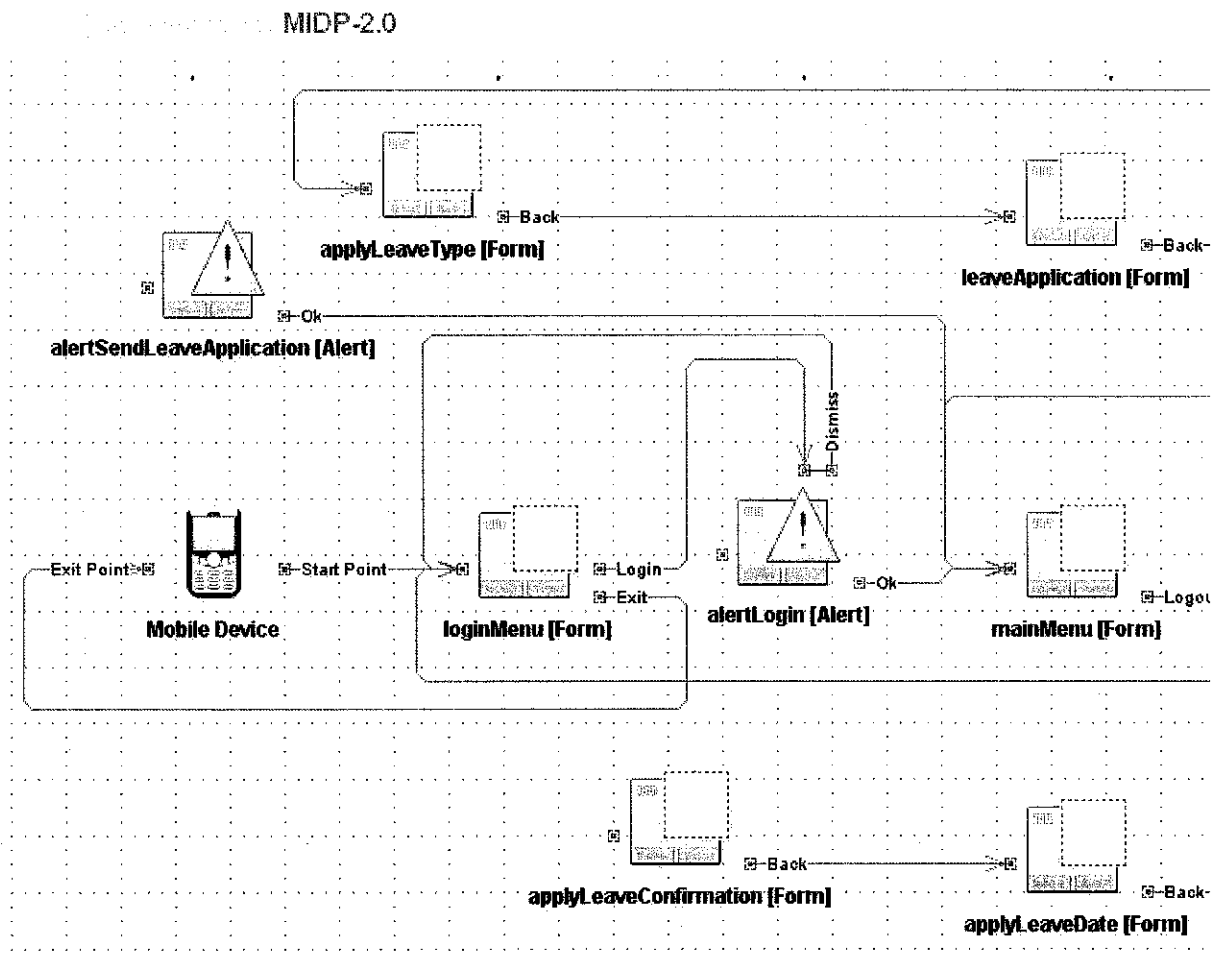


Figure 4.3 - System Architecture – System Workflow

4.1.4 Framework of the System

Based on Figure 4.1 and Figure 4.2, there are four main parts in the system of Mobile Staff Info which are the clients or staffs, a central administrator, associated departments and the database server. The architecture of the system is based on the server-client architecture. In this architecture, the client can only retrieve data from the server if and only if the server is running at that time. This is to ensure more security of the data and information in the database server when down time; for maintenance, upgrading, backup. The details for each parts of the system are as explained below:

- **Staff (Client)**

The staffs of the company are the clients of the system. To use the system, they will have to login first in the system. After successfully login to the system, they will retrieve data and information from the database server. This information includes their profiles, bulletin board, applications and the ICC. There are basically two ways of communication between the client (staffs) and the server (database server) which are sending and retrieving data. Staff's profile and bulletin board will be sent by the server to the client's device. In the other hand, requests for applications (leave, promotion) and ICC will be sent to database server (approved by the administrator) by the clients to be approved by associated departments.

The clients will be using PDAs as the medium of communication between them and the server. There are two types of operating system for PDA; Symbian OS is for PALMs, and Windows CE for Pocket PCs. The language to be used in this system will be in Java 2 Micro Edition or j2me. The reason to use j2me is it is a free open source code that can be implemented in both PALM and Pocket PC operating system.

- **Central Administrator**

The tasks of the administrator of the system will be on maintaining the system workflow and to give access and approval for clients. These access and approvals are the user's login and account, approve requests from clients to specific departments, approve the ICC, and check the updated bulletin in case of any redundancies and mistakes.

- **Associated Departments**

The associated departments are the departments (Human Resource, Finance, etc.) that will receive user's complaint and request of applications (approved by the administrator) from the database server. This information will be processed by the management of each departments and send the feedbacks or results back to the clients (by sending this information to the server) via the wireless LAN.

- **Database Server (Server)**

The database that will be used is MySQL. This database will be accessed by users' devices via a server.

This database will store users' profiles and their accounts, the bulletin board, users' complaints of ICC, and the requests of applications from clients. This database will be managed by the central administrator.

4.1.5 System Interface

These are the screenshots of the Graphical User Interface (GUI) of the developed system. This screenshots are based on an emulator and can also be viewed in hand phones (currently sony ericsson k750i).

- Login Menu

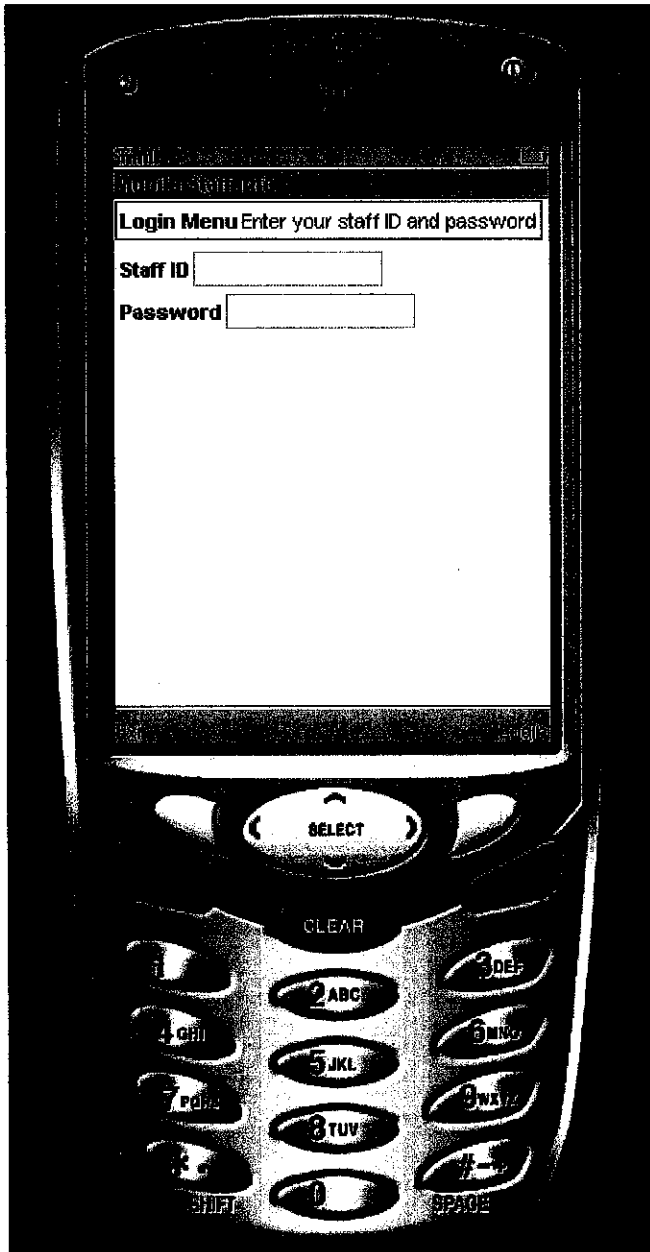
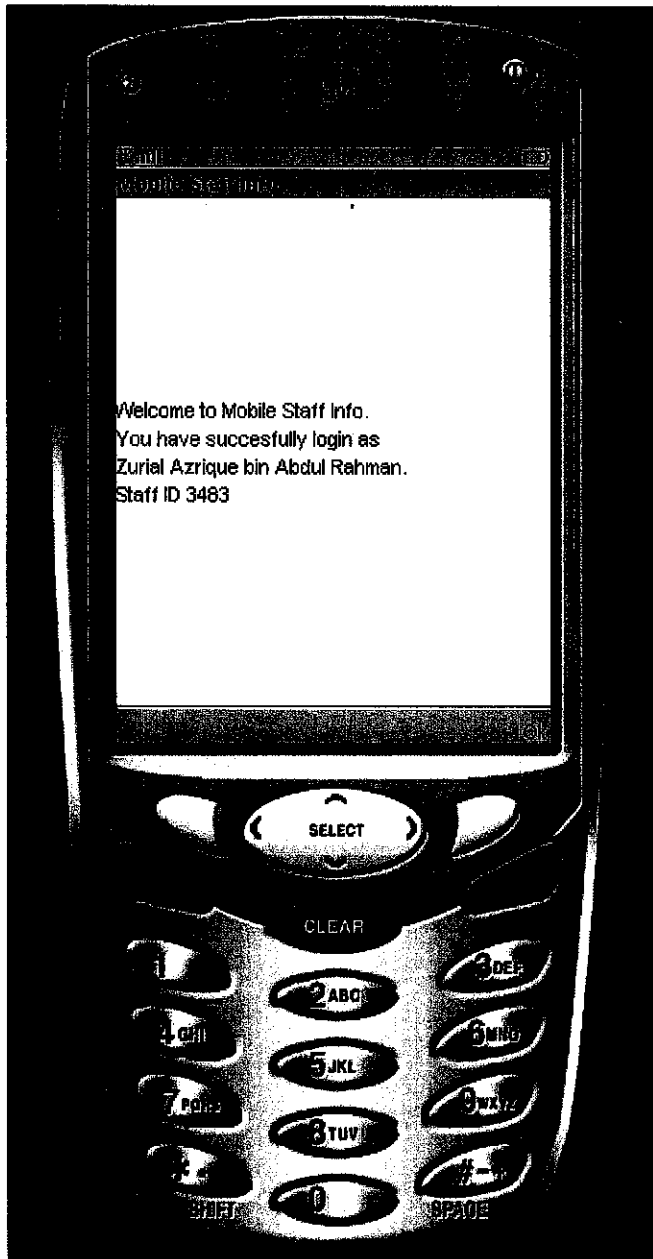


Figure 4.4 - System Interface – Login Menu

This is the first page of the MSI program that is the Login Menu. This page obliges users to enter their staff ID and password in order for them to use the program's services. This is also to prevent irresponsible personals from misusing the program of different users (different devices), such as applying false leave. There are two buttons which are the exit button, to exit the program, and the login button that is used to send the entered staff ID and password to the administrator in order to login successfully into the program.

- Alert Login



This is the alert screen after a successful login into the MSI program. This alert screen will display “Welcome to Mobile Staff Info. You have successfully login as <Name of the user>. Staff ID <Staff ID of the user>”.

Figure 4.5- System Interface – Alert Login

- Main Menu

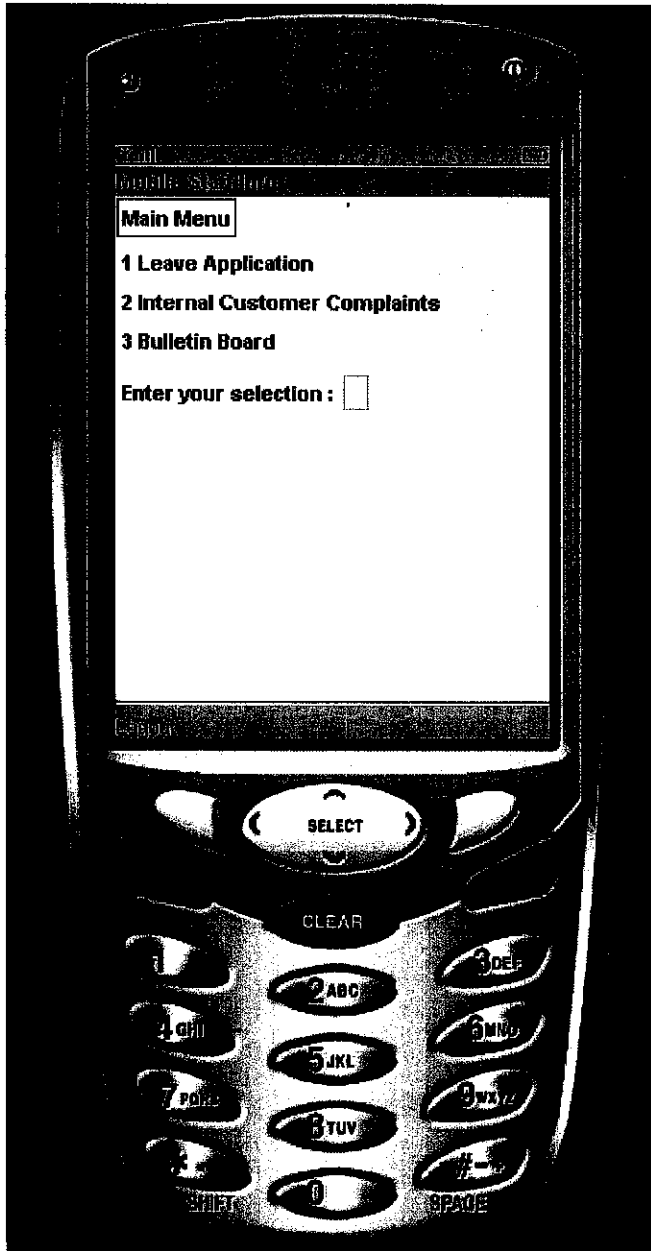


Figure 4.6 - System Interface – Main Menu

This is the main menu of the MSI program. There are three options for users to choose on which are Leave Application (1), Internal Customer Complaints (2) and Bulletin Board (3). For this prototype program, only Leave Application (1) is included in this program. Users will have to enter their selection and an Ok button will appear on the right side of the screen to be clicked on. Users can also logout to the Login Menu screen to exit or login as a different person, if such case of sharing of the same device happens.

- Leave Application



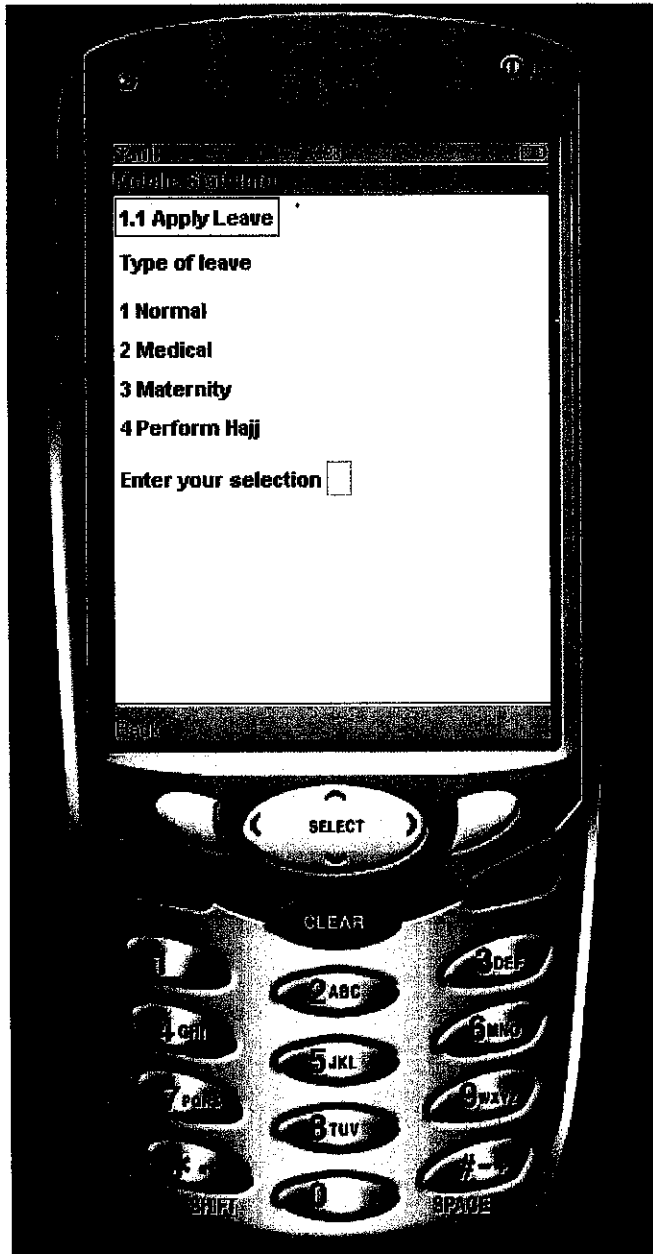
Figure 4.7 - System Interface – Leave Application

This is the menu for the leave application (1.0).

Users have the options of choosing to apply leave or new leave application (1) and to check their application history (2).

Only Apply Leave (1) will be accessible in this prototype program as the codes to manipulate the data within the program has not yet been found.

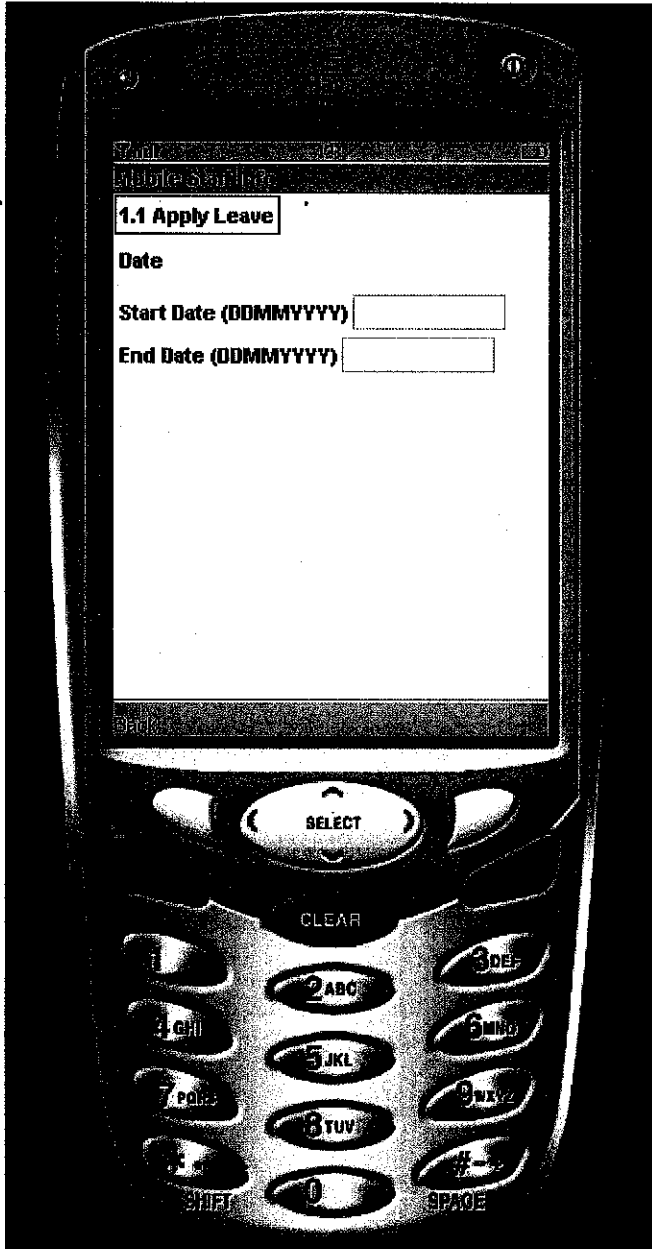
- Apply Leave Type



This is the menu for the apply leave (1.1). Users have to choose between 4 types of leave which are Normal (1), Medical (2), Maternity (3), and Perform Hajj (4). These selections are merely the options for the time being based on reference of the book **Perintah-Perintah Am dan Arahan Pentadbiran (disusun oleh Lembaga Penyelidikan Undang-Undang)** by International Law Book Services

Figure 4.8 - System Interface – Apply Leave Date

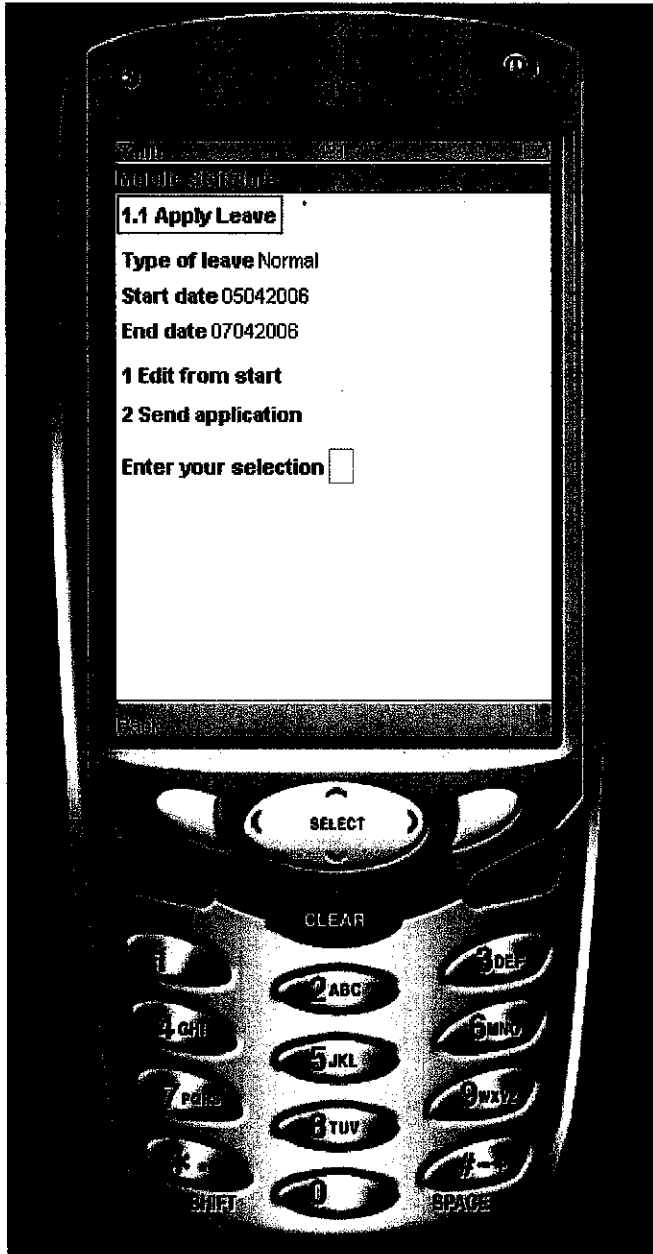
- **Apply Leave Date**



This is the Apply Leave Date page where users will have to enter the start date and end date of their leave application. An Ok button will appear after the text boxes has been filled.

Figure 4.9 - System Interface – Apply Leave Date

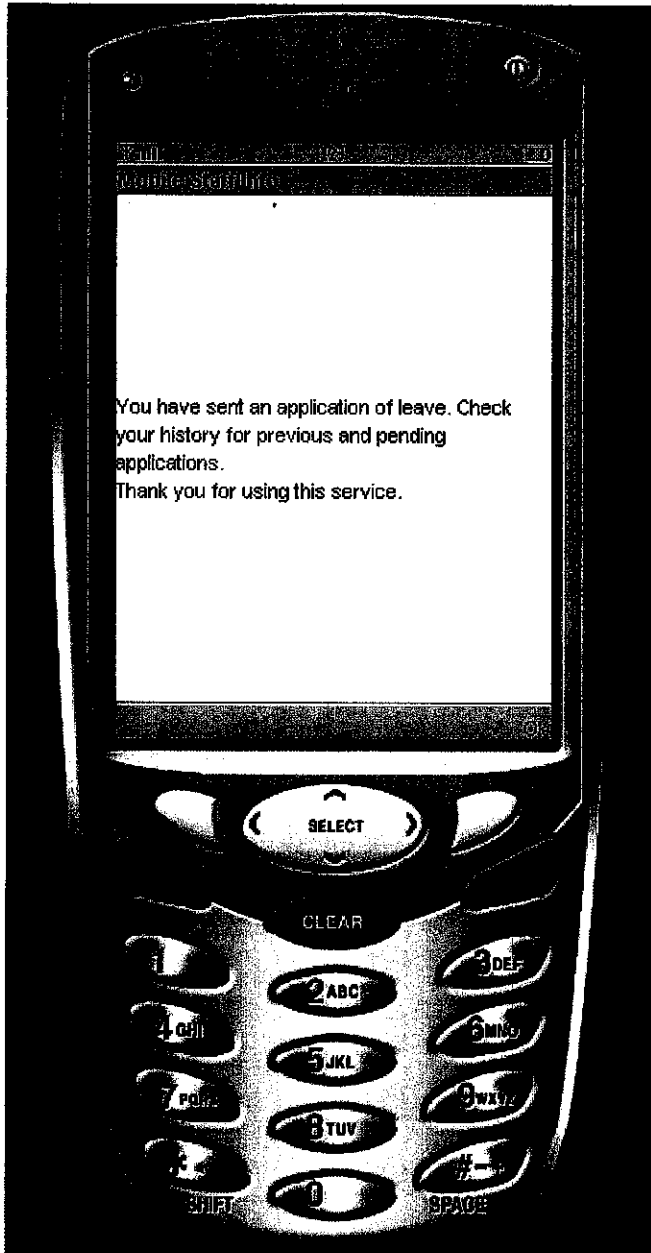
- **Apply Leave Confirmation**



This is the menu after users have clicked the Ok button from the previous page. This page is basically to confirm the leave application as this page will display the type of leave, start date and date accordance to the selection by the users. They will have the options of Edit from start (1), to edit the leave application from the start or to Send application (2), basically to confirm the application and send it to the administrator for approval.

Figure 4.10 - System Interface – Apply Leave Confirmation

- Alert Send Leave Application



This is an alert screen of the sending leave application. It will display "You have sent an application of leave. Check your history for previous and pending applications. Thank you for using this service."

Figure 4.11 - System Interface – Alert Send Leave Application

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

MSI program was developed to help staffs within a company using it in order for them to manage their leave, bulletin board and the ICC more effectively as it promotes users to use their mobile devices, reducing manually conventional procedures.

This program is an alternative for the current system in most company which is using paperwork. This will promote an effective and reliable way for staffs to apply and review back their history of leave (leave balance), to check on the bulletin board for the latest news and announcements, and lastly to complain or to improve the services within the company by suggestions through a proper approach using the ICC. Considering Wifi as the medium, staffs with the program installed in their devices can roam freely within the company radius and at the same time sending and receiving information needed. This is important especially in big companies where getting information and applying leave is a hassle.

The MSI will reduce the time and costs of manual system thus assisting staffs to be more efficient in their daily work. This reduction includes the reduction of paperwork, number of staffs managing the current manual system, the time used to manage the system, and the resources used by the current management (utensils, proper office, etc...). Information can also be spread easily to all staffs for them to be more alert of the company's activities.

This is the power of MSI – the flexibility to use company's services effectively, minus the hassles.

5.2 RECOMMENDATIONS

Future enhancements of MSI are as follows:

1. A working coding for the interconnection between the database and the MSI program.
2. Inclusion of the Bulletin Board and the Internal Customer Complaints for users to view the latest news or announcements and to complain or to suggest anything regarding to the company's services.
3. Inclusion of access points in various areas within the company to examine the efficiency of transmission for an effective medium for staffs to use the program.
4. The system can also be accessible via the Internet using computers to ease staffs without the tendency to leave their workplace to use the program more effectively.

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- [13] <http://wikipedia.org/>

APPENDIX

CODING

Login Menu

```
public Form get_loginMenu() {
    if (loginMenu == null) {
        // Insert pre-init code here

        loginMenu = new Form("Mobile Staff Info", new Item[] {
            get_stringItem1(),
            get_spacer1(),
            get_textField1(),
            get_textField2()
        });
        loginMenu.addCommand(get_exitCommand());
        loginMenu.addCommand(get_okCommand10());
        loginMenu.setCommandListener(this);
        // Insert post-init code here
    }
    return loginMenu;
}
```


Main Menu

```
public Form get_mainMenu() {
    if (mainMenu == null) {
        // Insert pre-init code here
        mainMenu = new Form("Mobile Staff Info", new Item[] {
            get_stringItem2(),
            get_spacer2(),
            get_choiceGroup1(),
            get_choiceGroup2(),
            get_choiceGroup3(),
            get_spacer3()
        });
        mainMenu.addCommand(get_okCommand12());
        mainMenu.addCommand(get_okCommand13());
        mainMenu.addCommand(get_okCommand14());
        mainMenu.addCommand(get_backCommand6());
        mainMenu.setCommandListener(this);
        // Insert post-init code here
    }
    return mainMenu;
}
```

Leave Application

```
public Form get_leaveApplication() {
    if (leaveApplication == null) {
        // Insert pre-init code here
        leaveApplication = new Form("Mobile Staff Info", new Item[] {
            get_stringItem3(),
            get_spacer4(),
            get_choiceGroup4(),
            get_choiceGroup5(),
            get_spacer5()
        });
        leaveApplication.addCommand(get_backCommand2());
        leaveApplication.addCommand(get_okCommand15());
        leaveApplication.addCommand(get_okCommand16());
        leaveApplication.setCommandListener(this);
        // Insert post-init code here
    }
    return leaveApplication;
}
```

Apply Leave Type

```
public Form get_applyLeaveType() {
    if (applyLeaveType == null) {
        // Insert pre-init code here
        applyLeaveType = new Form("Mobile Staff Info", new Item[] {
            get_stringItem4(),
            get_spacer6(),
            get_choiceGroup10(),
            get_spacer8(),
            get_choiceGroup6(),
            get_choiceGroup7(),
            get_choiceGroup8(),
        });
    }
    return applyLeaveType;
}
```

```

        get_choiceGroup9(),
        get_spacer7()
    });
    applyLeaveType.addCommand(get_backCommand3());
    applyLeaveType.addCommand(get_okCommand17());
    applyLeaveType.addCommand(get_okCommand18());
    applyLeaveType.addCommand(get_okCommand19());
    applyLeaveType.addCommand(get_okCommand20());
    applyLeaveType.setCommandListener(this);
    // Insert post-init code here
}
return applyLeaveType;
}

```

Apply Leave Date

```

public Form get_applyLeaveDate() {
    if (applyLeaveDate == null) {
        // Insert pre-init code here

        applyLeaveDate = new Form("Mobile Staff Info", new Item[] {
            get_stringItem5(),
            get_spacer9(),
            get_choiceGroup11(),
            get_spacer10(),
            get_textField6(),
            get_textField7()
        });
        applyLeaveDate.addCommand(get_backCommand4());
        applyLeaveDate.setCommandListener(this);
        // Insert post-init code here
    }
    return applyLeaveDate;
}

```

Apply Leave Confirmation

```
public Form get_applyLeaveConfirmation() {
    if (applyLeaveConfirmation == null) {
        // Insert pre-init code here
        applyLeaveConfirmation = new Form("Mobile Staff Info", new Item[] {
            get_stringItem6(),
            get_spacer11(),
            get_stringItem7(),
            get_stringItem8(),
            get_stringItem9(),
            get_spacer12(),
            get_choiceGroup12(),
            get_choiceGroup13(),
            get_choiceGroup14(),
            get_spacer13()
        });
        applyLeaveConfirmation.addCommand(get_backCommand5());
        applyLeaveConfirmation.addCommand(get_okCommand21());
        applyLeaveConfirmation.addCommand(get_okCommand22());
        applyLeaveConfirmation.addCommand(get_okCommand23());
        applyLeaveConfirmation.setCommandListener(this);
        // Insert post-init code here
    }
    return applyLeaveConfirmation;
}
```

Alert Send Leave Application

```
public Alert get_alertSendLeaveApplication() {
    if (alertSendLeaveApplication == null) {
        // Insert pre-init code here
        alertSendLeaveApplication = new Alert("Mobile Staff Info", "You have sent
an application of leave. Check your history for previous and pending
applications.\nThank you for using this service.", null, AlertType.INFO);
        alertSendLeaveApplication.addCommand(get_okCommand8());
        alertSendLeaveApplication.setCommandListener(this);
        alertSendLeaveApplication.setTimeout(-2);
        // Insert post-init code here
    }
    return alertSendLeaveApplication;
}
```