

## APPENDIX D

### Software Development for Mobile Phone Application: Card Dedication (MCards)

**Siti Fadhilah binti Sobri**  
Bachelor of Electrical Engineering (Hons)  
Faculty of Electrical Engineering  
University Teknologi Mara  
Shah Alam

#### Abstract

This paper is about designing and implementing the J2ME applications. The software program is specified for mobile devices. It is best to use Java because it offers an ideal platform for developing mobile commerce applications and using Java-enabled mobile devices. This project, MCards is designed to strike a balance between portability and usability. Products from Sun Microsystems such as Forte for Java 4, Java Development Kit (JDK) and Wireless Toolkit (WTK) were used from the beginning until the end of the software development.

#### Keywords:

Java 2 Micro Edition (J2ME), Mobile Application, Mobile Information, Integrated Development Environment (IDE).

#### 1.0 INTRODUCTION

Java was developed as a language of programming software that could be embedded into electronic devices regardless of the type of CPU used by the device. Originally designed for programs that control electronic devices, Java made waves in the Internet development community by providing a means to give intelligence to passive web pages [1]. Java which was developed by Sun Microsystems is divided into three separate platforms for different purposes. The original edition of Java, called the Java 2 Standard Edition (J2SE), consists of application programming interfaces (APIs) needed to build a Java application or applet. Java 2 Enterprise Edition (J2EE), is the detail designed version of the J2SE to accommodate n-tier architecture and has API to build applications for multi-tier architecture. The third platform is Java 2 Micro Edition, contains API

use to create applications for small computing devices including wireless java applications. J2ME platform is a collection of technologies and specifications that are designed for different parts of the small device market and hence, J2ME is therefore, divided into configurations, profiles and optional packages [2].

J2ME devices are characterized by certain features including [3]:

- i. Mobility.
- ii. Incapability to access power from the mains (battery powered).
- iii. Limited memory and processing power.
- iv. Small display screens.
- v. Limitations with respect to input and output methods.

J2ME is divided into several different configurations and profiles. Configurations contain the java language core libraries for a range of devices, which consist of two parts [4]:

- i. Connected Device Configuration (CDC) is designed for relatively big and powerful devices such as high-end PDAs, set top boxes, and network appliances. CDC has more advanced security than CLDC.
- ii. Connected limited Device Configuration (CLDC) is designed for small, resource constrained devices such as mobile phones and low-end PDAs.

Profiles lie on top of each configuration. Profiles define more advanced, device-specific API libraries including GUI (Graphic User Interface) and each profile is suited for a range of similar devices. The Mobile Information Device Profile (MIDP) and the PDA Profile are the profile for CLDC. MIDP is designed for mobile phone and the applications written for this profile are called MIDlets. The Foundation Profile and the Personal Profile are the profiles for CDC [5].

In addition to benefiting the developers, J2ME also promised advantages for mobile manufacturers, mobile network operators, and end users. To mobile manufacturers, J2ME offers an opportunity to foster a large and prolific development community that could deliver new and value-added functionality for their devices. To network operators, J2ME offers an opportunity to push new applications that would drive increased usage for recently deployed data services. And to end users, J2ME offers an opportunity to turn a mobile phone into a multipurpose device similar to a PC or PDA because nowadays people expect the software capabilities found on their desktop (PC) to be available on their phones, and expand the basic functionality beyond simple voice calling .

The trend now shows that the demand for various types of wireless applications is on the rise as the mobile devices are gaining popularity.

J2ME platform is deployed on billions of devices, supported by leading tool vendors, and used by companies worldwide, and in short, it is the platform of choice for today's consumer and embedded devices[6]. Network programming plays an important role in wireless application development to take advantage of the connectivity these devices have to offer[7]. J2ME has become a popular option for creating games for mobile phones as they can be emulated or tested on a computer or laptop during the development stage and can easily uploaded to the phone. J2ME application allows user interactions such as display an electronic form on the mobile screen, collect user input, process the input and display the results on the screen. For example, a businessman wants to check the available flights and hotel while on a business trip. He can purchase the airline ticket and book hotel for accommodation. He can also retrieve the data stored in his mobile phone to use during his trip. Using a mobile to do shopping and transactions is now possible

without have to sit in front of a computer or laptop. Buying books, book for a movie ticket or an airline ticket, and much more will not be a problem anymore and save time without having to go to shopping complexes.

This project, MCards was developed as an alternative for today's mobile phone application. Right now in Malaysia, there is no company or network provider offers a service to deliver event cards (birthday, anniversary etc.). The objective is to reduce the time taken to do shopping or transactions without having to go to other places. This paper does not cover the areas concerning the connection with the network provider and the service provider (cards supplier).

## 2.0 METHODOLOGY

There are a few requirements to follow in order to complete this project. To write a J2ME or a mobile programming, using the right and appropriate software is very important. It is very expensive to buy the software so the easiest way for me to do is just download it from the Internet (Sun Microsystems Web site).

First, I have to install the SDK. For this project, J2 SDK (Software Development Kit or its other name is JDK which stands for Java Development Kit, JDK) version 1.4.0 is used. Next, Forte for Java 4, Mobile Edition Integrated Development Environment (IDE) is installed which contains the J2ME platform necessary to create applications for mobile (mobile programming). The IDE supports developing applications for handheld, wireless devices and the J2ME platform for MIDP and CLDC. Forte for Java provides integrated editing, compiling, graphical user interface (GUI) designing used for any platform running J2 SDK[8] . I have to install the WTK which is a set of tools that makes it possible to create applications for mobile phones and other wireless devices. The most important thing is to have a laptop or computer to install the J2SDK. In this project, I'm using a laptop with standard Windows platform, with sufficient memory to support all the software.

To write a mobile programming, one should be familiar with MIDlet. A MIDlet is a J2ME application designed to operate on an MIDP small computing device. The J2ME Wireless Toolkit (WTK) provides templates to create MIDlet and MIDlet suite. MIDlet refers to a

basic unit of execution in an MIDP application. A MIDlet has three states, which is active, pause, and destroyed.

To develop a basic application, open Forte for Java 4, create a new project and mount a local directory to create and store files in the directory (follow the instructions given during creating the file). Next, create a MIDlet suite followed by MIDlet. MIDlet property is specified by accepting the default values. Emulator is specified by also accepting the default. Emulator include different devices (mobile phones) used for simulating operations, and can reduce the time taken for testing mobile applications. For this project, DefaultColor Phone is used to simulate my project. It represents a mobile phone by having the similar characteristics such as colour support, display screen, and provides keypad (digits and alphabet keys). After all the necessary requirements are fulfilled, the Source Editor will display the code for the newly created MIDlet. The codes can be edited to suit one's requirements. A MIDlet is a Java class that extends the class `javax.microedition.midlet`. Now, compiled the MIDlet suite. If there are errors, there will be error notification (Output Windows) at the bottom of the Source Editor including the line numbers at which the errors occur. Correct the errors until the Output Windows display a message that the application has been successfully compiled. To view the output of the application on the emulator screen, execute the MIDlet suite. Launch the application by clicking the Launch button on the emulator. Using J2ME, I can place pictures in the programming and the output will display it accordingly.

As stated earlier, MCards is an application for mobile user to order card and send a request to the service provider to send it to anyone they like. Fig.1 shows the flow of MCards process from the beginning until the end. Starting the application, MCards is executed and the emulator will display the cards that are available to the mobile user which is provided by the service provider. User can select one card or he or she can exit the application by clicking the Exit button. Then the item number, price and the free gift will be displayed if the user clicked the Menu button. After that, there will be three choices for the user to choose, whether he wants to view further information about the card, or he wants to purchase the card by filling the forms

available on the screen after he clicked Order, or he can make a reminder by click Set An Alert.

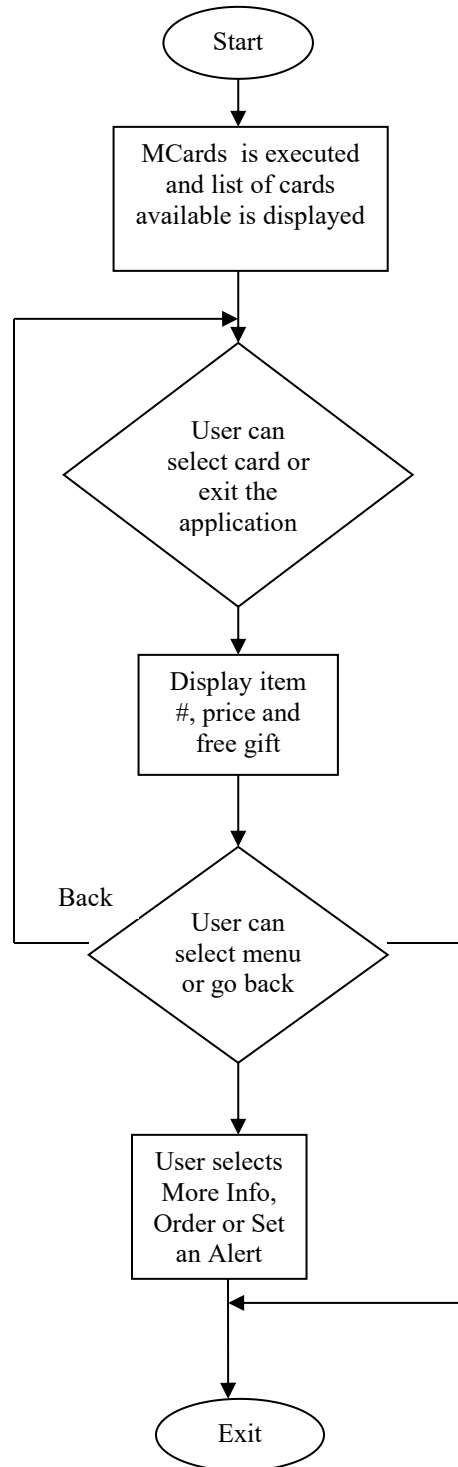


Figure 1: Flow Chart for Mobile Application (MCards)

### 3.0 RESULTS AND DISCUSSION



Figure 2

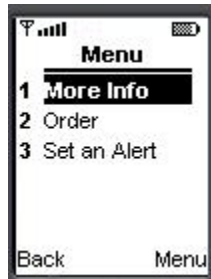


Figure 3

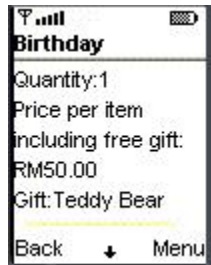


Figure 4

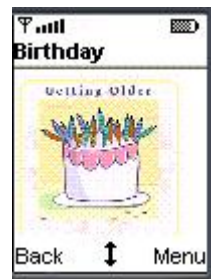


Figure 5



Figure 6



Figure 7



Figure 8



Figure 9



Figure 10

Figure 1 – 10: Flow of MCards

Fig. 1 until Fig 10 are the flow of the MCards mobile application. When the application is launched, the Choose Card screen will appear as shown in Fig. 2. User can choose one card from the card list. For example, a user selects birthday card. If the user wants to know more about the card, he has to click the More Info that is displayed on the screen, as shown in Fig.3. The detailed about the birthday card is displayed in Fig.4 with the card price, free gift and picture of the birthday card as shown in Fig.5. If the user

wishes to purchase the card, he can fill the forms as in Fig.6. If he wants to browse for other cards he can click the Back button.

Let say that the user want to purchase the birthday card, he has to type the name of the person that he wishes the card to be sent to, the message in the forms in Fig. 6. If he does not fill any of the forms, he is not allowed to proceed. After the forms are filled, user has to click the Next button to allow him to enter the quantity of the birthday card, and the screen will also display again the type of card, price and the free gift (Fig. 7). Fig. 8 shows a display of the item number along with the quantity of the card when the Next button in Fig. 7 is clicked. In Fig.9, when the user clicked the submit button, a gauge or an animated progress bar that represents the status of the process is displayed. The process of sending an order is completed when the gauge moves to the end of the bar. Then a popup will be displayed to indicate that the order has been received. Fig. 10 shows an alert form for the user to make a reminder. It is stated earlier, that this project is unable to connect with the service provider (company that provides events cards) and the network operators.

This mobile application is lacking a few things. For example, after the order is complete where the service provider has sent the alert stating that an order has been received, the screen should have Menu button or Cards button to allow user to go straight to the list cards or the Menu. But in this case, the only button is Back button (see Fig.11). In order to go back to the list cards, user has to click the Back button several times, which may bring difficulties to user. For further implementation, the Cards or Menu button should be added to facilitate the user without having to click the Back button for several times. The screen size is too small to include a bigger picture. Actually the birthday picture dimension is 170 x 170 pixels. I have to scroll down the screen if I want to see the whole picture. So, I reduced the dimension to 85 x 85 pixels. Other alternative that I can do is set other emulator (phone) that has bigger screen size that the one that I used in this project.

The format of a picture is very important. The software that I'm using do not support Bitmap image, but only support PNG image. So I have to change the Bitmap picture format into PNG format.



Figure 11: Message to inform that the company has received the customer's order

## 5.0 CONCLUSION

From the results, the objective of this project is achieved. Mobile user can choose to use variety of applications if the network operators and service providers developed various type of mobile application. The developers can write many useful mobile applications to cater the increased number of mobile users and to satisfy them apart from make profit.

## 6.0 ACKNOWLEDGEMENT

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## 7.0 FUTURE DEVELOPMENT

For future development, this software needs to establish a connection with the network operator and the service provider to enable it to run in real-time environment. The software is proposed to include the Record Management System (RMS) whereby the RMS is an application programming interface (API), used to store and manipulating data in small computing devices. All the data is save for reference before submitted to the network operator and then the network operator will send the data to the card supplier for the next action. The cost of the card and the delivery will be charge into the user phone bill. Mobile applications in the future should come with interesting graphics and animation with the right package to attract mobile users.

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