APPLICATION DEVELOPMENT WITH J2ME FOR MOBILE PHONE

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Application Development with J2ME for Mobile Phone

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Abstract— With mobile commerce technology continuously being taken more into use and introduced in new markets, the transition to mobile commerce (m-commerce) will make mobile shopping exceedingly popular. In the near future mobile shopping will probably replace today's markets or shopping complex.

This project presents a mobile application which is built using Mobile Information Device Profile (MIDP) of the Java 2 Platform Micro Edition (J2ME), that enable users to purchase flowers without a trip to the market or elsewhere. Users can access the application or service through mobile phones and view the available items. The application has been deployed and run on an emulator (Wireless Toolkit 2.5 Beta) with a DefaultColorPhone as the default emulator.

Keywords— mobile application, m-commerce, MIDP, J2ME

I. INTRODUCTION

Recently, the advent of wireless and mobile technology as a subset of e-commerce has created both new opportunities and new challenges for the business community [1]. The emergence of wireless and mobile networks has made possible the admission of e-commerce as a new application but on a different platform called as m-commerce, which is defined as the exchange or buying and selling of commodities, services or information on the Internet through the use of mobile handheld devices [2]. M-commerce has come forward to become the hottest new trend in business transactions.

M-commerce is the successor of today's PC-based, wired, e-commerce technology. The evolving success of mobile communication is transforming the e-commerce (wired environment) into m-commerce (wireless environment) and the users of mobile devices are considered as a large group of potential market [4].

Although it can be compared to the prevalent web shopping, m-commerce is different in many ways partly because of the unique features of mobile devices, such as tiny screen display limiting much text and big graphic images, narrow bandwidth resulting in low transmission speed, clumsy input entry frustrating customers, and multiple functionality hindering the adoption of m-commerce [3].

Many sophisticated applications designed for mobile devices require the device to process information beyond the capabilities of the WAP specifications. J2ME provides the standard to fill this gap. So, the application is created based on J2ME platform whereas it enables the application to be custom-fitted to resources available on mobile devices. A key benefit of using J2ME is that J2ME is compatible with all Java-enabled devices such as Motorola, Nokia Ericsson and Panasonic.

Many things that required a trip to the market or elsewhere, can now being done on the mobile. The J2ME has made it possible to do many things remotely and is now a fact of life. Mobile application or more specifically mobile ordering system enables the users to place an order while sitting anywhere and at any time.

II. JAVA 2 MOBILE EDITION (J2ME)

J2ME is the next evolution of Java introduced by Sun Microsystems as a new breed of portable communications devices opened the opportunities at the turn of the century [6]. J2ME is also known as a reduced version of the Java API and Java Virtual Machine (JVM) that is designed to operate within the sparse resources available in the new breed of embedded computers and microcomputers.

Why consider J2ME in the first place, when we already have WAP or SMS technologies to handle M-flowers? The foundation and ideology of Java and J2ME brings itself a reasonable set of potentials of being a part in M-flowers. According to the press and general signals from the market, J2ME has a massive focus and is considered as an attractive technology for building mobile applications.

But there are several concrete arguments that indicate why J2ME should be considered as an interesting supplement for m-commerce - these are [6]:

- *Lower network usage and server load*: J2ME based applications can operate when disconnected and only interacts with a server when necessary. J2ME has its own runtime environment and the possibility of storing data in the mobile device.

- *Enhanced user experience*: The J2ME API provides enhanced possibilities for presenting GUI's like event handling and richer graphics [6].

- *Persistent storage*: The official MIDP1.0 API provides facilities for persistent storage (record store)

of data [6]. The integrity of the record stores is kept throughout the normal use of the platform, including reboots, battery changes, etc. and is independent of any SIM/WIM [6].

III.MOBILE APPLICATION: DESIGN AND IMPLEMENTATION

This section presents a mobile application; M-Flowers. In the development of the application, a development environment is made up of tools, underlying APIs and the operating platform necessary for developing applications. Developing M-Flowers using J2ME technology required the following:

- Java 2 Software Development Kit (J2SDK) v1.4 or higher
- Wireless Toolkit Beta 2.5
- Mobile Device Simulators: These are custom-built software packages that run on a mobile application development environment, which mimic the activities, functions and appearance of the given mobile device (cell phone, PDA, or pager) they are modeled on.

The M-Flowers has been implemented using Forte for Java release 4.0 Mobile Edition. The software was chosen to do the compilation for two reasons: First, the software includes a set of tools for the developments of applications targeting the Java 2 Platform Micro Edition (J2ME) for Java-enabled mobile devices. So, there is no need to add Mobile Edition libraries to the software. Secondly, the using of J2ME Wireless Toolkit in the Forte for Java is indeed a much easier way to do compilation without having to bother with giving classpaths. Besides, the toolkit is meant for MIDP only and not for other profiles.

The Wireless Toolkit (WTK25) is a set of tools for creating MIDP applications. It consists of three main components:

- *KToolbar* automates many of the tasks involved in creating MIDP applications.
- The *emulator* is a simulated mobile phone. It is useful for testing MIDP applications.
- A collection of *utilities* provides other useful functionality, including a text messaging console and cryptographic utilities.

The portability of the mobile device applications is tested using the emulations of various mobile devices. The J2ME Wireless Toolkit provides emulations of various devices. The following emulators are installed in the Forte for Java IDE:

- DefaultColorPhone
- DefaultGrayPhone
- MediaControlSkin
- QwertyDevice

The design of M-Flowers is divided into two parts: On the first part is MIDP development. A MIDlet application is created using the Forte for Java Mobile Edition. The first step in MIDP development is adding an emulator. An emulator is added to the existing list of emulators by using steps explained by Mogha & Bhargava [5]. Then, M-Flowers project is created. The project configuration is specified by selecting Mobile Information Device Profile (CLDC/MIDP). Next, a MIDlet Suite is created. A MIDlet suite consists of a JAVA Application Descriptor (JAD) file and a Java Archive (JAR) file. A JAD file includes a predefined attribute set [5]. The application management software uses this attribute set for identifying, retrieving, and installing MIDlets [5]. A MIDlet is a Java class that forms the simplest unit of execution in an MIDP application [6]. After creating a MIDlet suite, MIDlet is added to it. The development of MIDP is summarized in Figure 1.
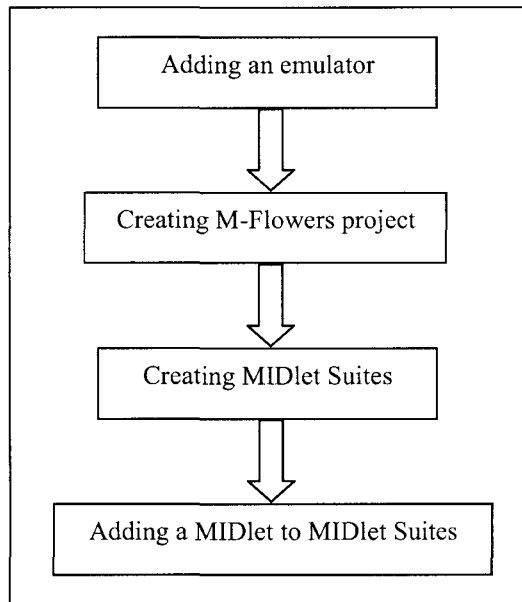

Figure 1. MIDP development flowchart

On the second part is the User Interface (UI) design. Considering the limitations of the target devices, the User Interface of M-Flowers was designed such that the need for substantial amount of data entry was kept to a barest minimum. Each screen was designed with strict adherence to industry recommendation as specified in documents such as the J2ME MIDP user interface guide (Sun Microsystems, 2002). The UI design minimizes the need for users to enter long streams of text by providing Option Lists for selection in place of elaborate textboxes.

IV.RESULTS

On starting the application, the user sees a Welcome screen followed by Main Screen displaying the list of items (flowers), their colors and their prices as shown in Figure 2. The default flower to be displayed is set to Daisy. Users can view the available flowers by expanding the "pop-up" menu list and highlights the flower they want to avail and the available flowers with brief details are shown in terms of radio button choice group.
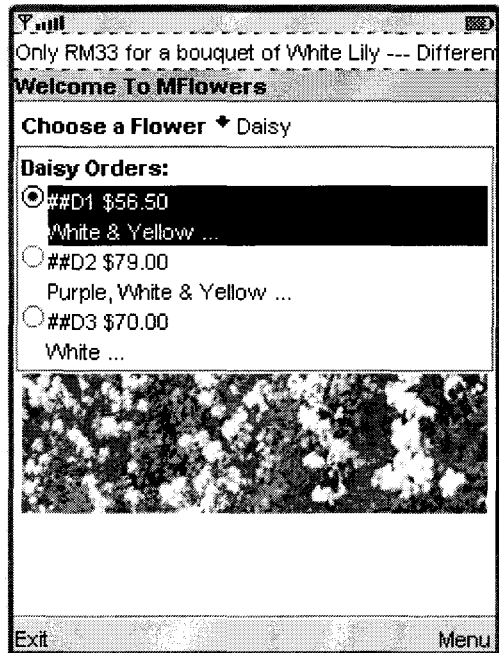
Figure 2. Application main screen of a mobile phone emulator

An item can be selected by moving the mobile up and down cursors. More details information on the items can be shown by selecting the "Show More Info" option at the Menu on the bottom right of the screen as shown in Figure 3(a). For the Show More Info option, users will see a screen as in Figure 3(b) which listing name of flower along with its index number, quantity, item price, service charge, total price which is the sum of item price and service charge, colour and also flower theme.

(a)   (b)

Figure 3. (a) Menu options (b) item details

To proceed with the order, users must choose "Place an Order" at the menu option. The order form is displayed on the screen, and the user enters information into the text field of the order form as shown in Figure 4(a). The device collects the order information and then processes the order. The confirmation notice is then displayed on the screen which is shown in Figure 4(b).
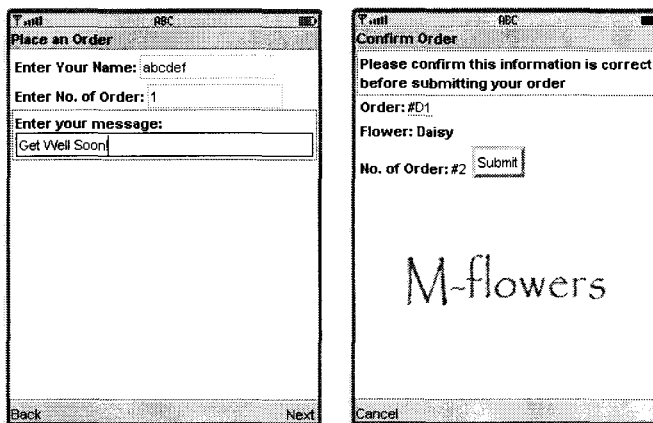

(a)   (b)

Figure 4. (a) Order Screen (b) Confirmation screen

If users select the Submit button on the Confirmation screen, the next screen appears displaying the non-interactive gauge which shows the progress of the order. The gauge screen is shown in Figure 5(a).
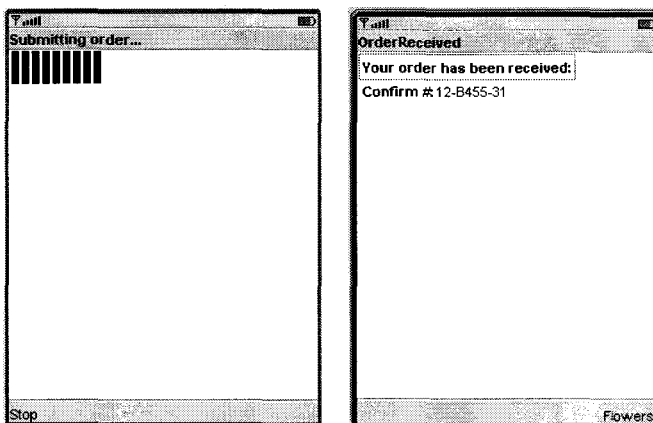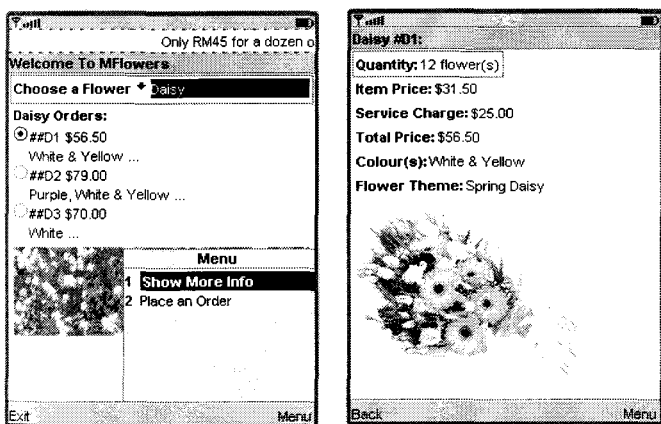

Figure 5. (a) Gauge Screen (b) Order Received Screen

After the progress or the animation of the gauge stops, a new screen appears that displays a message to notify the user that the order as received. The Order Received screen is shown Figure 5(b).

V. CONCLUSIONS AND FUTURE WORKS

This paper presented a development of application using J2ME for mobile phones. M-Flowers is an application with a strong interdependence of existing internet or online ordering systems. This application is an extra option to existing

shopping or buying methods and the mobile phone can be considered as another tool for carrying out the service.

This project has focused on the basic requirements for ordering system application in the mobile phone. And if it is to be used in real world, there are a lot of other things that must be added to the current application.

One of the requirements among other things is the database. When using the mobile phone as an ordering tool, the phone can act as a terminal. In these situations the data handling and transmitting meets a lot of challenges. Many different initiatives and forums have been established to cope with these challenges, with the main focus of developing standards for the application, to be a successful mobile ordering system.

The supplier may already have a J2SE or J2EE application for receiving orders from customers sitting in front of their PCs. This means there is already an application running for receiving requests and sending response. In the mobile case, this is done using Java Server Pages. The items and their quantities available are stored in a database on a server. There are two JSP scripts – one reads the database and displays the list of items and their quantities, and the other saves the values of quantities ordered by customers to the database.

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