Using Mobile Devices for Electronic Commerce

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INTRODUCTION

Electronic commerce is becoming the most used mechanism for non-traditional commerce. However, several popular delivery services are still accessed via telephone, which enables commerce anytime, anywhere. Such telephony-based services have several problems: they do not offer a more detailed description of available products; users may ask the attendant to repeat the description of a certain product, directly affecting the time of product selling; the number of concurrently attended clients is limited to the number of attendants; and the product list must also be continuously updated, by adding or removing products, but the user cannot be automatically informed about that.

Mobile devices offer a sophisticated interface that allows better user interaction by means of lists, menus, multimedia features such as images, and much more. A user can indefinitely explore product categories very fast. It is possible to offer a more detailed description of products, with visual elements such as pictures or even videos. Besides, the number of concurrent accesses depends only on the number of connections supported by the server.

In this article, we describe an architecture for mobile commerce which allows the use of mobile devices for electronic commerce. The architecture enables the development of applications to be executed on a mobile device, which lists selling products having their own textual descriptions and pictures. We discuss architectural modules and the implementation of an application for selling fast food called Mobile Menu. We begin with the main background concepts related to our proposed architecture.

BACKGROUND

Electronic commerce has attracted significant attention in the last few years (Varsghney & Vetter, 2002). The continuously increasing number of users of mobile devices, such as mobile phones and personal digital assistants (PDAs), and advances in wireless network technology provide an ideal scenario for offering personalized services to mobile users and give place to the rapid development of mobile electronic commerce (MEC) (Tsalgatidou, Veijalainen, & Pitoura, 2000).

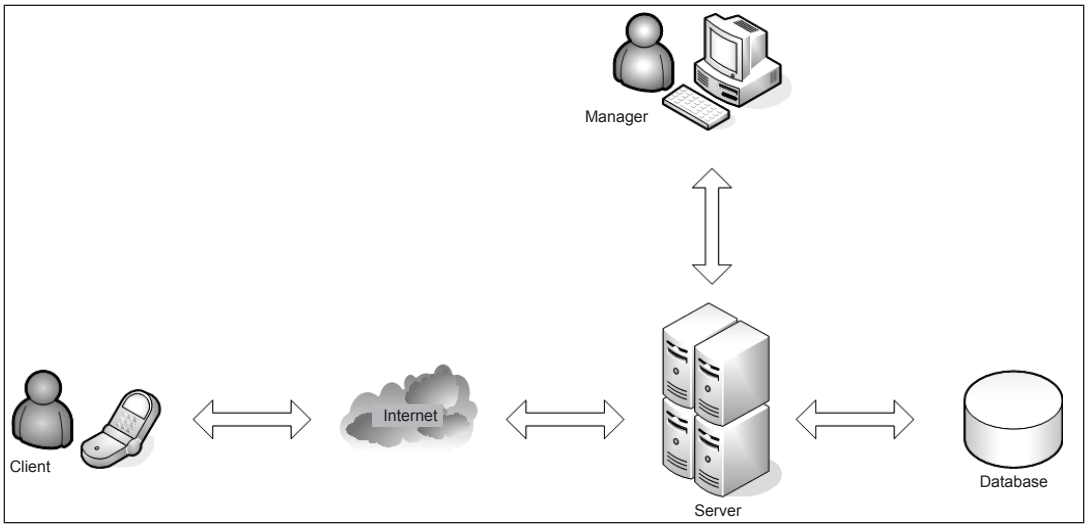
The way MEC operates is partially different from Internet e-commerce due to special characteristics and constrains of mobile terminals and wireless networks. The context, situation, and circumstances under which people use their mobile devices are also different (Tsalgatidou et al., 2000).

Wireless and mobile networks are increasing in exponential rate in terms of capabilities of mobile devices and user acceptance (Varsghney & Vetter, 2002). Today, more than 1 billion cell phones and other mobile devices are in use worldwide. MEC also has more advantages than traditional e-commerce applications: location-awareness, adaptivity, ubiquity, personalization, and broadcasting (Tsalgatidou et al., 2000). Applications for mobile devices are also easier to use, because the user interface of such devices is very intuitive.

Mobile devices have less resources than desktop and mainframes computers: limited memory, disk capacity, and computational power. The user interface of such devices also has some constrains: for example, small screens and small multi-functional keypads (Tsalgatidou et al., 2000). These constrains restrict the variety of applications for mobile devices and must be taken into account when designing new systems for such platforms.

Applications that demand a considerable quantity of system resources are harder to develop for mobile devices. For example, applications that need a large database to constantly perform queries and update the data are very difficult to develop for mobile devices, because the limited memory of devices does not support a database management system (DMS). Distributed architecture shares tasks among the elements of it, so that harder activities which demand memory and computational power can be allocated to those which have more resources.

Figure 1. Mobile menu architecture



Client-server architecture is largely used as a distributed design; it shares the tasks of the elements and provides a certain level of decoupling. It has two elements that establish communication with each other: the front-end or client, and the back-end or server. The client makes a service request to the server whereas the server provides service to the request. The client-server architecture allows an efficient way to interconnect programs that are distributed at different places (Jorwekar, 2005). However, client-server architecture is more than just a separation of a user from a server computer (Fastie, 1999). Each portion also has its own modules: presentation, which handles inputs from devices and outputs to screen display, application, and data; application, which has the rules of the business; and data, which provides services for storing the data of the application (Fastie, 1999).

AN ARCHITECTURE FOR MOBILE COMMERCE

We propose an architecture that enables mobile commerce for mobile devices. The architecture is illustrated in Figure 1. The application has three elements: the *client,* which requests the information about selling products; the *manager,* which updates information on the products; and the *server,* which receives requests and sends responses.

To start with, the user accesses the service anytime and establishes a connection with the server. Then, a list with pre-defined categories of products is sent to the user. These categories help the user to browse through the list of products. After selecting the product, the user can obtain more specific information about it or purchase the item, if more detailed information about the product is requested. At the other side, the server receives the request of purchasing or obtaining more information about the product, such as name, description, and price. Other more elaborate elements that describe the products, such as pictures and videos, can be attached. The application can be accessed anytime.

The client application can run on a mobile device and establishes a connection with the server. It requests services to the server and receives the data. The server has two modules: the network layer, which manages the network connection of the mobile devices; and the database layer, which establishes connection with the database and manages data.

Another important element of the application is the manager side. It is a desktop application which interacts with the system by modifying the database: it inserts or removes products and also modifies information about them, like price, name, and description.

This architecture provides an interesting solution by delegating tasks for members of the system: client, server, and manager. The tasks performed by each one does not demand a considerable amount of resources from each system. For example, a mobile device cannot store a large amount of data. Thus, the architecture delegates the storing/processing tasks to the server that is supposed to have more resources. The layered architecture decouples the modules, so each one can be modified interchangeably, and also provides reuse of code.

Mobile Menu

Food delivery is a frequently used service usually accessed via telephone. It has some problems that affect the business, for example: detailed descriptions about the products are not easy available; for each client, an attendant is allocated; and a request can be mistakenly made.

Based on the architecture described, we developed Mobile Menu, which is an application for fast food mobile commerce.