Chapter 4.32
Payment Mechanism of Mobile Agent–Based Restaurant Ordering System

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INTRODUCTION

The Internet, especially the World Wide Web, is moving from a free, academic domain to a profitable commercial world. This underscores the importance of a digitally secure means of electronic payment for an electronic commerce application. The payment is usually an important part of an electronic commerce transaction, and it deals with the transfer of trust, either as cryptographically signed promises, or as digital cash, between the customer, the merchant, and the payment service provider.

Due to the explosive growth of e-commerce transactions, many electronic modes of payment are devised to address a diverse set of Internet user requirements (Guida, Stahl, Bunt et al., 2004; Tsiakis & Sthephanides, 2005; Garfinkel, 2003; Usher, 2003; Polk, Hastings, & Malpani, 2003; Evans & Yen, 2005; Marchesini, Smith, & Zhao, 2005; Lancaster, Yen, & Huang, 2003; Lekkas, 2003; Medvinsky & Neuman, 1995; Schoenmakers, 1997; Levi & Koc, 2001; Mahony, Peirce, & Tewari, 2001; DigiCash Press, 1994; Neuman & Tso, 1994; Vivtek, 2000).

The background of this article is that we have developed a mobile agent-based restaurant reservation and ordering system whereby users are able to search for restaurants that fulfill a list of user-entered parameters (e.g., type of cuisines, ambiance, specialties such as steaks, etc.) (Quah & Leow, 2003). The system is built on the IBM

Aglet mobile agent platform. (A mobile agent is a small executable code/program that can migrate itself to remote hosts and execute predefined instructions—e.g., information retrieval, and return the processed information to its originating host system) (Lanage & Oshima, 1998). Due to the uniqueness of our system, we find the existing e-commerce payment methods inadequate to fit our system's need. As such, we studied several existing methods and adapted one into our system operation structure. The use of mobile agent to implement the payment system adds robustness and scalability to the system.

DESCRIPTION OF THE ELECTRONIC PAYMENT SYSTEM

To support electronic commerce, various Internet payment protocols have been proposed and adopted by a variety of organizations. In fact, the existence of different payment mechanisms are justified because there are different needs to be satisfied in terms of:

- Cryptographic needs (strong, symmetric, exportable, importable, etc.)
- Latency of the transaction (micropayment must be very fast)
- Minimal and maximal amount for the transaction itself
- Minimal and maximal amount for the cost of the transaction
- Repudiation, notarization needs
- Involvement of financial institution (i.e., online vs. off-line)

Some of the above requirements may call for contradictory system requirements, and as such, trade-offs have to be made. In a nutshell, an electronic payment system should meet the following requirements:

1. Sufficient security means based on the amount of money transferred in a transaction.
2. Similar running scenario as the traditional business whenever possible to ease the doubts of the public and encourage them to participate.
3. Minimum changes on the current financial system to avoid tremendous costs when electronic commerce is introduced.

The participants of an electronic commerce transaction must be able to exchange trade and payment information over a network. The implementation addresses the problem of online payment by credit card in which anyone with knowledge of the customer's credit card number can create an order for payment. It also tries to eliminate the requirement of a Certificate Authority (CA), and consequently a CA-based Public Key Infrastructure (PKI), in order to verify a public key-based digital signature.

Characteristics of the Mobile Agent-Based Restaurant Order Payment System

Secure Socket Layer- (SSL) (Rainbow Technologies, 2001; Freier, Karlton, & Kocher, 1996; Albrecht, 1998) based protocols used in credit card payment are convenient but have some authentication and non-repudiation problems. Secure Electronic Transaction standard (SET) (MasterCard, 1997) and other payment-card-based protocols, which require either intermediary agents or CA-based PKI, are secure, but not so convenient, particularly for financial institutions (FIs). The mechanism of our implementation tries to find a middle ground in the "security vs. convenience" trade-off.

In our payment mechanism implementation, both the customer and the merchant need to be registered off-line with a network payment service

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