Chapter 3.10
A Virtual Community for Mobile Agents

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INTRODUCTION

Electronic commerce (e-commerce) is booming with the increasing accessibility of the Internet. E-commerce is revolutionizing the concept of carrying out business functions. By using a Web browser, buyers are able to access numerous e-commerce Web sites, where they can make purchases within a reasonable price range. Suppliers realize that e-commerce is essential to the success and competitiveness of their businesses. The benefits of conducting business online include reduction of the cost for many transactions and streamlining of operations.

However, there are also some obstacles to the success of e-commerce. Firstly, buyers may be lost in the ocean of the items available. Secondly, it is a tedious task to search for a specific product through the Internet and it is difficult to bargain within the current infrastructure. Thirdly, some transactions are so complicated that they are too difficult to be dealt with. For instance, merchants often negotiate transactions with multiple issues of concern such as price, quantity, and method of delivery. Many strategies are adopted to accomplish these tasks, and both the negotiating counterparts and the environment can affect the choice of the strategies. However, in many existing auction Web sites, price is the main focus for both bidders and sellers. Bidders and sellers are seldom given a chance to negotiate the other issues, and many commercial opportunities are neglected.

This chapter discusses SAFER for e-commerce (secure agent fabrication, evolution & roaming for e-commerce), which uses secure agents to alleviate problems in e-commerce

BACKGROUND

Software agents have demonstrated potential in conducting transactional tasks in e-commerce through the Internet. It acts on behalf of an entity to carry out a delegated task. One of the earliest agents in e-commerce is the shopping agent, which carries out automatic comparative price shopping on the Web. A client can assign one or many shopping agents to carry out the shopping task. Agents can gather price information and present it to the client for a decision. Certainly, the task of a software agent involves more than online data gathering and filtering. For example, software agents are also used in negotiation (Guttman & Maes, 1998; Krishna & Ramesh, 1998). Negotiation agents are instructed with expected prices, quantities, delivery modes, and/or negotiation strategies (Oliver, 1996; Kang, 1998). Besides, software agents can also undertake other tasks, such as payment (Guan & Hua, 2003; Guan et al., 2004), mediation, distribution, interaction and sales promotion in e-commerce.

Software agents (Bradshaw, 1997; Poh & Guan, 2000; Wang et al., 2002; Guan & Zhu, 2002; 2004; Guan et al., 2004) can be endowed with attributes such as mobility, intelligence and autonomy. To alleviate concerns such as authorization, traceability, integrity, and security in e-commerce and the Internet, constructing appropriate architecture for agent systems in e-commerce is a fundamental consideration in facilitating agent-based transactions (Lee, 1997; Guan & Yang, 2004). As software agents become more common, there is a need for skilled programmers and even ordinary e-commerce clients to manipulate them. A practical way is to provide sites with methods to fabricate various agents according to the requirements of the clients. Agents should have an evolutional ability to enhance its intelligence and survivability. Roaming is one of the basic capabilities for agents so that they can fully utilize the power of network computing. They can achieve timesaving and cost cutting in completing its task without compromising security by roaming from one host to another (Yang & Guan, 2000; Guan & Yang, 2002).

THE SAFER ARCHITECTURE

SAFER is an infrastructure to serve agents in e-commerce and establish the necessary mechanisms to manipulate them. The goal of SAFER is to recommend standard, dynamic and evolutionary agent systems for e-commerce. The SAFER architecture comprises different communities as described in Figure 1. Each community consists of the following components: owner, butler, agent, agent factory, community administration center, agent charger, agent immigration, clearing house and bank. Each component will be elaborated in the following subsections.

Community

Agents can be grouped into many communities based on certain criteria. In order to distinguish agents in the SAFER architecture from those that are not, we divide them into SAFER communities and non-SAFER communities as shown in Figure 1. We shall only discuss the SAFER community. Each SAFER community can possess a set of the facilities and individuals as described in Figure 2. Figure 2 only lists the necessary components in one community. Some community may have more entities than those depicted in the figure. For instance, there can be two agent chargers in a large community.

In order to become a SAFER community member, an applicant should apply to his local community administration center. The center will issue a certification to the applicant whenever it accepts the application. A digital certificate will be issued to prove the certified status of the applicant. To decide whether a facility or individual belongs to a community, one can look up the roster in the community administration center. A