Chapter XI

SAFER E-Commerce: Secure Agent Fabrication, Evolution, & Roaming for E-Commerce

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As electronic commerce (e-commerce) booms, the demands for intelligent tools to streamline transactions are increasing. This motivates the development of the next generation of e-commerce, agent-based e-commerce. This chapter proposes a Secure Agent Fabrication, Evolution, & Roaming (SAFER) architecture for agent-based e-commerce. SAFER provides services for agents in e-commerce and establishes a rich set of mechanisms to manage and secure them. The definitions and functions of the various components in the SAFER architecture are elaborated. This chapter also illustrates three main aspects in the SAFER architecture: agent fabrication, agent evolution, and agent roaming.

INTRODUCTION

Electronic commerce (e-commerce) is booming with the increasing accessibility of the Internet in almost every corner of the world. The World Trade Organization expects worldwide e-commerce revenues to reach US $200 billion in the next two years. E-commerce is revolutionizing the concept of carrying out business dealings. 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. E-commerce has challenged some aspects of traditional commerce and, at the same time, is presenting a valuable opportunity for both suppliers and buyers. The benefits of conducting business online include significant reduction of the cost for many transactions and streamlining of operations. For these reasons, we can perform transactions without leaving our desks, and small companies have the chance to compete with larger ones.

However, there are also some obstacles to the success of e-commerce. Firstly, buyers may be lost in the ocean of the items available, and eventually miss the best deal. 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 employed 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. In fact, most of them lack an intelligent tool to help streamline the transaction procedures (Guilfoyle, 1994).

To overcome this, a new generation of e-commerce, agent-based e-commerce, is emerging and software agents are playing a crucial role in it. Software agents have demonstrated tremendous 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 through the Internet first. The filtered and classified information is presented to the client for a decision. Certainly, the task of a software agent involves more than merely online data gathering and filtering. For example, software agents are also employed in negotiation. Negotiation agents are instructed with expected prices, quantities, delivery modes, and/or negotiation strategies. One agent can automatically launch a negotiation with a suitable counterpart. They may make offers, accept offers, make counter-offers similar to a tete-a-tete negotiation, and may even strike a successful deal in the end (Oliver, 1996; Kang, 1998). Besides, software agents can also undertake other tasks such as payment, mediation, distribution, interaction, and sales promotion in e-commerce.

With the development of Internet computing and software agent, agent-based e-commerce will become more and more mature. In particular, software agents may have significant contributions in this field. They can perform tasks in simple, intelligent, and independent manners. However, there can be potential dangers along with the merits. We should be careful of the side effects such as breaching privacy and inducing social mischief. Despite these, agent-based e-commerce is a promising novelty. We should utilize its full advantages while minimizing the potential risks (Bradshaw, 1997; Ahuja, 1996).

Software agents 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). 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. Due to the nature of e-commerce and the Internet, agents should be able to adapt to a changing environment automatically. We also need to look into the situation that there will be competitions and collaborations among various types of agents that belong to different owners. 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

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