Chapter 1.9
Linking Businesses for Competitive Advantage:
A Mobile Agent–Based Approach

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ABSTRACT

In a highly competitive business environment, every organization is trying to achieve more using fewer resources. This is particularly true in this Internet era, where many businesses are moving from "brick-and-mortar"-based operation towards having at least an Internet presence, where e-commerce is fast gaining acceptance. Recent advances in mobile agent technology promise yet another powerful tool to gain competitive advantage—to deliver cost-effective services through utilizing Internet infrastructure. Such a development helps both individuals and organizations achieve higher productivity at lower cost. In this chapter, the authors describe an intelligent mobile agent-based system that links hotels and restaurants to provide gourmet goers with a convenient way of searching for their choice restaurants. The system sends off intelligent mobile agents to automatically roam the Internet, gather the relevant information about food and services from participating restaurants, and provide the most optimized selection as suggestions to help the users make their meals decision. This greatly reduces information overload for the users. Participating business establishments also benefit, through increased business.

INTRODUCTION

Agent-based systems have gained prominence over the last few years. One of the most interesting categories of agents is mobile agents (Lange & Oshima, 1998). Unlike static agents, which are restricted to operate within a single machine or address space, mobile agents have the ability to migrate over the network, execute tasks at each location and potentially interact with other agents that cross their paths. Advantages of mobile agents

include their ability to reduce network usage, increase asynchrony between clients and servers, add client-specified functionality to servers and introduce concurrency. These features help lower computing costs of modern businesses as well as better manage network traffic, as illustrated below.

Many online business transactions involve processes that require extensive database searches and matches. For example, users of an online bookstore are likely to view various catalogs, matching descriptions with preferences they have in mind before deciding which books to purchase. As such, information search and filtering applications often download and process large amounts of server-resident information and generate comparatively small amounts of result data. The scenario is greatly different with a mobile agent-based system, where mobile agents move to and execute on server machines and access server data without using the network, reducing bandwidth requirements. Many of today's applications involve repeated client-server interactions, which require either maintaining a network connection over an extended period or making several separate requests. If mobile agents are used instead, the client system does not have to maintain a network connection when its agents access and process information. This permits increased asynchrony between the client and server. This feature is especially useful for mobile computers (such as laptops and PDAs), which typically have low-bandwidth, unreliable connections to the network and are often switched off to save power consumption. Also, the repeated client-server interactions are reduced to two agent-transfer operations, reducing the frequency of network usage, as well.

An example of a user-level application would be an electronic marketplace. Vendors can set up online shops, with products, services or information for sale. A customer's agent would carry a shopping list along with a set of preferences, visit various sellers, find the best deal based on user preferences and purchase the product using digital forms of cash. An added advantage of such a system is that businesses may also be linked up to form a chain, such that mobile agents may move between stores within a business chain to make their purchases. Such a setup will enhance the competitive advantages of participating online stores.

Apart from mobility, a mobile agent-based system will need mechanisms for restricted resource access, secure electronic commerce, protection of agent data, robustness and user control over roaming agents. These will be discussed in later sections.

MOBILE AGENTS: ISSUES AND DEVELOPMENTS

Agents-Enabled Electronic Commerce

Mobile agents offer a number of useful possibilities:

- The agent can express the application-level protocol required to perform a transaction. This includes dialogs on choices and options, configurations, availability, delivery methods and opportunities for setting up, as well as complete and accurate capture of information required by the vendor in a particular format. Mobile agents technology is a plausible method for vendors to distribute the client end of a transaction protocol in a device-independent way.
- Alternatively, the mobile agent may be able to present the consumer's desire as a query to a number of potential vendors to determine degree of match, price, availability and so forth.
- The agent may also be able to consult a "consumer guide" or other advisor before making a purchase.

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