Chapter XII
Enterprise Application Integration from the Point of View of Agent Paradigm

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ABSTRACT

The agent paradigm in general underlines the interaction phenomenon in a collaborative organization while respecting the autonomy and self-interested features of individual components. Relevant use of the agent paradigm will be one of the key factors to success in application integration projects in the near future. This chapter describes the basic notions of intelligent agents and multiagent systems, and proposes possible types of their application to enterprise integration. The agent-based approaches to enterprise application integration are considered from three points of view: (a) using an agent as a wrapper of applications or services, (b) constructing a multiagent organization within which agents are interacting and providing emergent solutions to enterprise problems, and (c) using the agent as an intelligent handler of heterogeneous data resources in an open environment.

INTRODUCTION

Today’s business information systems are not isolated applications. Businesses are trying more and more to offer collaborative services, using an open communication infrastructure, such as the Internet, for the purpose of creating and operating worldwide services.

The early stage of integration efforts mainly addressed the problem of technical-level interoperability between heterogeneous applications providing application-to-application middleware. Nevertheless, the complex business context of nowadays requires higher level collaboration among applications in order to satisfy the properties of responsibility or agility, that is to say the following.

• Due to the responsibility, services required by clients should be safely offered
Agility means continuously monitoring market demands and quickly providing new products.

Concerning the first point, a business should try to satisfy its clients even when it is impossible to offer a service because of some failures. Searching for another service provider that is capable of offering a similar service may be a possible solution in that situation. In long-term vision, this strategy can better service clients. From the technological point of view, today’s Web services standards may be useful for constructing integrated networks of applications among business partners. The environment of business information systems is highly volatile. For this reason, the creation, enactment, and management of such collaborative networks require special concerns. In many Web services composition projects, one of the hot issues is how to provide an effective means of searching for appropriate services and business partners.

For the second point, the possibility of reusing existing components will be a key factor for the successful development of new services within a short period of time. In that context, not only reusing one's own data sources and applications, but also benefiting from applications and services of other firms—through a certain form of collaboration and negotiation—will be helpful.

In order to confront these problems, CIOs (chief information officers) should think of progressively moving the abstract level of the interoperable medium from data handled by applications to services guaranteed by businesses. Rather than achieving integration, they should aim at constructing a collaborative organization that provides the dynamic just-in-time interaction of services. The agent paradigm in general underlines the interaction phenomenon in a collaborative organization while respecting the autonomy and self-interested features of individual components. The relevant use of the agent paradigm will be one of the key factors to success in the near future in application integration projects.

This is the reason why this chapter is dedicated to reviewing some principle concepts of intelligent agents and multiagent systems. This chapter is organized as follows. In the next section, principal concepts concerning intelligent agents and multiagent systems are briefly discussed. Then the chapter discusses the taxonomy of enterprise application integration in general. Next, it presents agent-based approaches to enterprise application integration. Finally, a short summary and concluding remarks are given.

INTELLIGENT AGENTS AND MULTIAGENT SYSTEMS

First of all, it is necessary to give the definition of the term agent. The most widely accepted definition could be the one given by Wooldridge (2002, p.15): “An agent is a computer system that is situated in some environment, and that is capable of autonomous action in this environment in order to meet its design objectives.” The kinds of intelligent capabilities of agents are then considered as follows.

- **Reactivity:** The ability to perceive the environment and respond in a timely fashion to changes
- **Proactivity:** The ability to pursue goals by taking the initiative in order to satisfy design objectives
- **Social ability:** The capability of interacting with other agents in order to satisfy the social goal

The studies of agents are multidisciplinary research results from the domains of artificial intelligence and logic, distributed computing, psychology, social science, artificial life, ecology, engineering and robotics, and so on. For this reason, it is always a debatable question of defining...
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